

Driving Axles and Drive Shafts

**GROUP
15**

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PART 15-01 General Driving Axle and Drive Shaft Service

COMPONENT INDEX Applies to Models As Indicated	All Models	Ford	Mercury	Meteor	Cougar	Fairlane	Falcon	Maverick	Montego	Mustang	Lincoln-Continental	Thunderbird	Continental-Mark III
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Integral Carrier	01-08	N/A	01-08	N/A	N/A	01-08	01-08	N/A	01-08	N/A	N/A	N/A	N/A
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A page number indicates that the item is for the vehicle(s) listed at the head of the column.

N/A indicates that the item is not applicable to the vehicle(s) listed.

MANUFACTURED BY
FORD MOTOR COMPANY

100001

69/60 THIS VEHICLE CONFORMS
TO ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY STAN-
DARDS IN EFFECT ON DATE OF
MANUFACTURE SHOWN ABOVE

VEH. IDENT. NO.	BODY	COL	
OE51N100001	54E	M	
TRIM	AXLE	TRNS.	DSO
1B	4	W	33

NOT FOR TITLE OR REGISTRATION

MADE IN U.S.A.

CONVENTIONAL DIFF. CODE	TRACTION-LOK DIFF. CODE	RATIO
0		2.50:1
2	K	2.75:1
3	L	2.79:1
4	M	2.80:1
5		2.83:1
6	O	3.00:1
7		3.10:1
8	Q	3.20:1
9	R	3.25:1
A	S	3.50:1
B		3.07:1
C	U	3.08:1
F	X	2.33:1
	V	3.91:1
	W	4.30:1

E1917-B

FIG. 1—Vehicle Certification Label—Rear Axle Identification

COMPONENT INDEX Applies Only to Models Indicated	All Models	Ford	Mercury	Meteor	Cougar	Fairlane	Falcon	Maverick	Montego	Mustang	Lincoln- Continental	Thunderbird	Continental- Mark III
BEARING CUPS Cleaning and Inspection	01-10												
CARRIER HOUSING Cleaning and Inspection	01-11												
CHECKING GEAR TOOTH PATTERNS	01-03												
CHECKING TRACTION-LOK DIFFERENTIAL OPERATION		01-03	01-03	01-03	01-03	01-03	N/A	N/A	01-03	01-03	01-03	01-03	01-03
CHECKING REAR AXLE COMPANION FLANGE RUNOUT		01-05	01-05	01-05	01-05	01-05	01-05	01-05	01-05	01-05	01-07	01-07	01-07
DIFFERENTIAL BEARING ADJUSTING NUTS Cleaning and Inspection	01-10												
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SHIM AND BACKLASH CHANGES													
Integral Carrier		01-05	N/A	01-05	N/A	N/A	01-05	01-05	N/A	01-05	N/A	N/A	N/A
Removable Carrier	01-05												
U-JOINT FLANGE Cleaning and Inspection	01-10												

A page number indicates that the item is for the vehicle(s) listed at the head of the column.

N/A indicates that the item is not applicable to the vehicle(s) listed.

1 AXLE CHECKS

TRACTION-LOK DIFFERENTIAL OPERATION CHECK

A Traction-Lok differential can be checked for proper operation without removing the carrier from the axle housing.

Jack up one rear wheel and remove the wheel cover. Install the tool on the axle shaft flange studs as shown in Fig. 2.

Using a torque wrench of at least 200 ft-lbs capacity, rotate the axle shaft. Be sure that the transmission is

in neutral, one rear wheel is on the floor, and the other rear wheel is raised off the floor. The torque required to continuously rotate the shaft should be at least 40 ft-lbs. The initial breakaway torque may be higher than the continuous turning torque, but this is normal. The axle shaft should turn with even pressure throughout the check without slipping or binding.

If the torque reading is less than specified, check the differential for improper assembly.

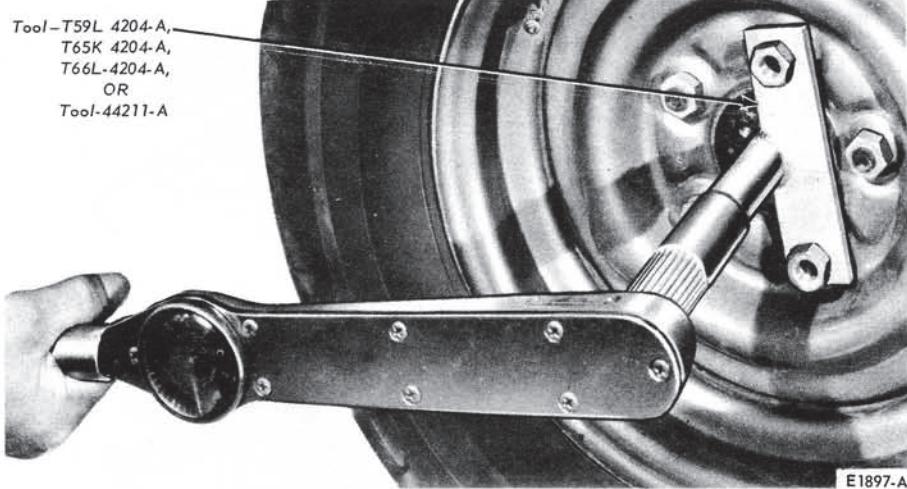


FIG. 2—Traction-Lok Differential Check

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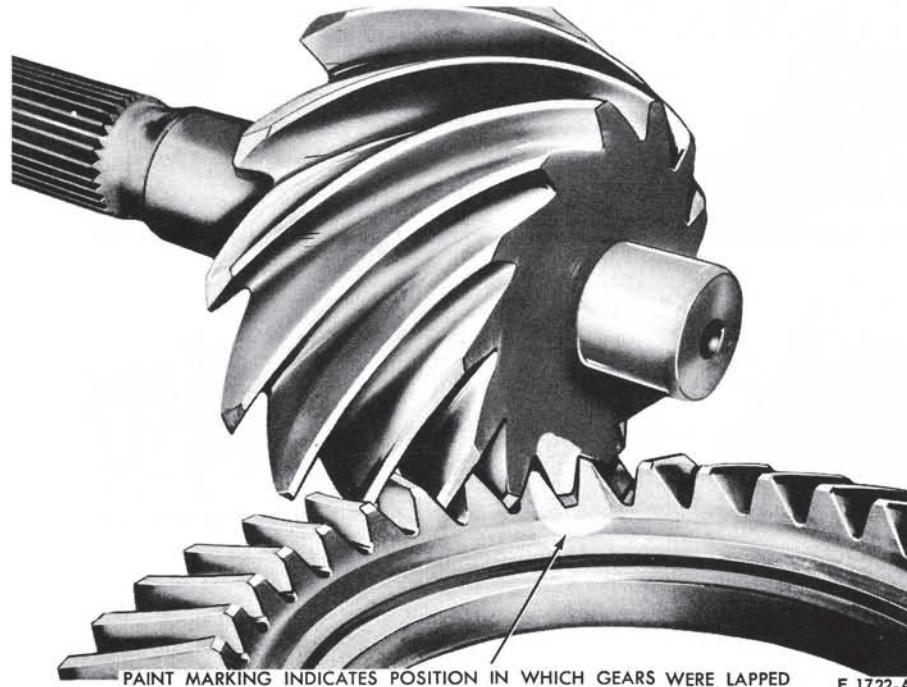


FIG. 3—Gear Set Timing Marks

A vehicle equipped with a Traction-Lok differential will always have both wheels driving. If, while the vehicle is being serviced, only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor will drive the vehicle off the stand or jack.

GEAR TOOTH CONTACT PATTERN CHECK

When rolling a tooth pattern, use the special compound (tube) packed with each service ring gear and pinion set.

Paint all gear teeth and roll a pattern as described in Section 3. After diagnosing the tooth pattern as explained here, make the appropriate adjustments as outlined in Section 2.

In making a final gear tooth contact pattern check, it is necessary to recognize the fact that there are three different types of gear sets, hunting, non-hunting and partial non-hunting. Each type is determined by the number of teeth in the gears. The non-hunting and partial non-hunting types can be identified by the paint timing marks on the pinion and ring gear teeth (Fig. 3).

ACCEPTABLE TOOTH PATTERNS (ALL AXLES)

Figure 4 shows acceptable tooth patterns for all axles. Any combination of drive and coast patterns shown will be acceptable.

In general, desirable tooth patterns should have the following characteristics:

1. The drive pattern should be fairly well centered on the tooth.
2. The coast pattern should be fairly well centered on the tooth.
3. Some clearance between the pattern and the top of the tooth is desirable.
4. There should be no hard lines where the pressure is high.

The individual gear set need not conform exactly to the ideal pattern to be acceptable.

Any combination of drive and coast patterns shown in Fig. 4 are acceptable.

Hunting Gear Set

In a hunting-type gear set, any one pinion gear tooth comes into contact

ACCEPTABLE TOOTH PATTERN LIMITS

ANY COMBINATION OF DRIVE AND COAST PATTERNS SHOWN PERMISSIBLE

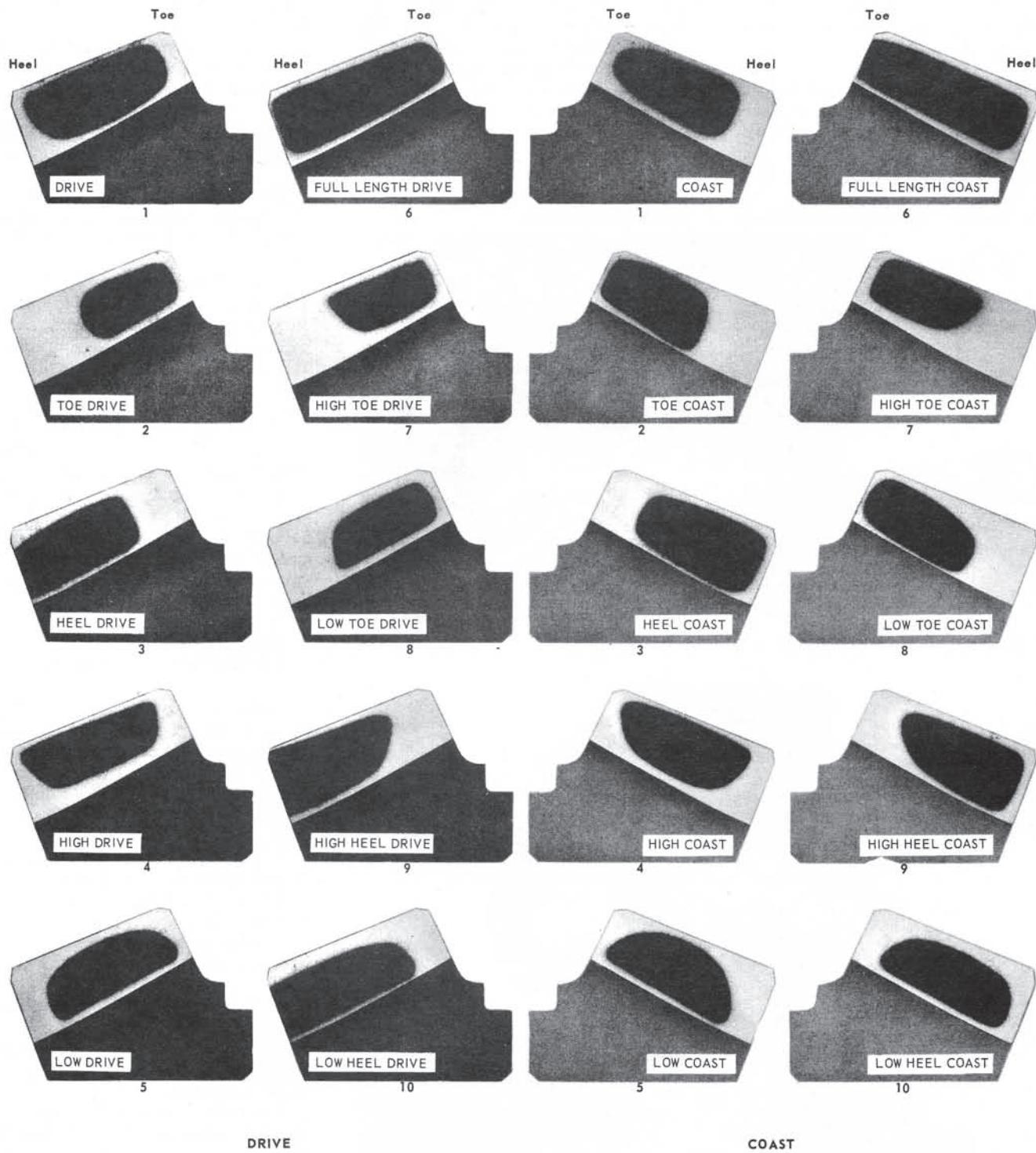


FIG. 4 — Acceptable Tooth Pattern Limits (All Axles)

with all ring gear teeth. In this type, several revolutions of the ring gear are required to make all possible gear combinations.

Any combination of drive and coast patterns shown in Fig. 4 will be acceptable.

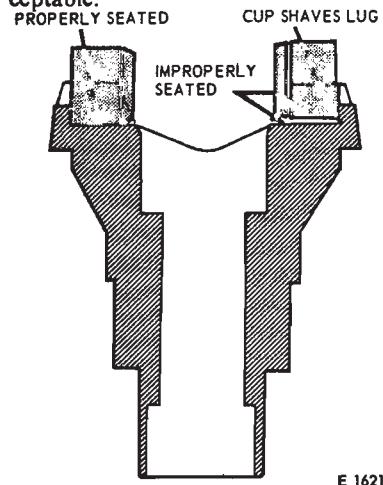


FIG. 5—Checking Companion Flange

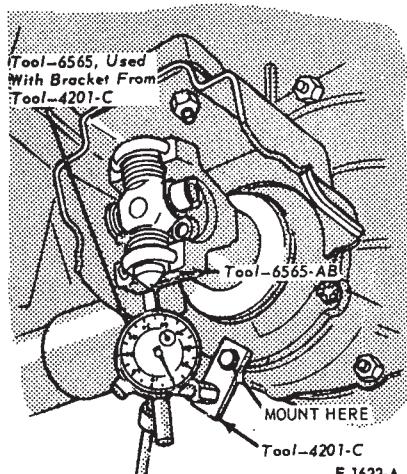


FIG. 6—Flange Bearing Cup Run-out Check—Typical

Non-Hunting Gear Set

In a non-hunting type gear set, any one pinion gear tooth comes into contact with only a few ring gear teeth. In this type, only one revolution of the ring gear is required to make all possible tooth contact combinations. Any combination of drive and coast patterns shown in Fig. 4 will be acceptable.

Partial Non-Hunting Gear Set

In a partial non-hunting type gear set, any one pinion tooth comes into contact with only part of the ring gear teeth, but more than one revolution of the ring gear is required to make all possible gear tooth combinations. Any combination of drive and coast patterns shown in Fig. 4 will be acceptable.

SHIM AND BACKLASH CHANGES

Since each gear set rolls a characteristic pattern, the patterns shown in Fig. 4 are considered acceptable and should be used as a guide. The drive pattern is rolled on the convex side of the tooth, and the coast pattern is rolled on the concave side.

The movement of tooth contact patterns with changes in shimming can be summarized as follows:

Removable Carrier Type Axle

1. Thicker shim with the backlash set to specifications moves the pinion further from the ring gear:

2. Thinner shim with the backlash set to specifications moves the pinion closer to the ring gear:

If the patterns are not correct, make the changes as indicated. The

pinion need not be disassembled to change a shim. All that is required is to remove the pinion, bearing, and retainer assembly and install a different shim. When reinstalling the pinion and retainer assembly of a non-hunting or partial non-hunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 3).

Integral Carrier Type Axle

1. Thinner shim with the backlash set to specifications moves the pinion farther from the ring gear.

2. Thicker shim with the backlash set to specifications moves the pinion closer to the ring gear.

If the patterns are not correct, make the changes as indicated. The differential case and drive pinion will have to be removed from the carrier casting to change a shim. When reinstalling the pinion and ring gear of a non-hunting or partial non-hunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 3).

REAR AXLE COMPANION FLANGE RUNOUT CHECK

ALL AXLES EXCEPT THUNDERBIRD AND CONTINENTAL MARK III

1. Raise the vehicle on a hoist that supports the rear axle (twin-post hoist).

2. Remove the driveshaft assembly (Part 15-5).

3. Check the companion flange damage to the universal joint bearing locating lugs. If the universal joint bearing locating lugs on the companion flange are shaved (worn) or damaged, replace the companion flange (Fig. 5).

4. The rear axle companion flange runout is checked with a modified universal joint (checking tool) a dial indicator with 1.000 inch minimum travel, and a cup-shaped dial indicator adapter tool (Fig. 6). To fabricate the checking tool, modify a universal joint assembly by removing two bearing cups that are opposite each other, and cutting or grinding off one of the universal joint bearing flanges (Fig. 6).

5. Install the cup-shaped adapter on the dial indicator stem. Install the dial indicator on the pinion retainer or pinion nose bumper bracket. Position the indicator to allow an indica-

Indicator Reading	Flange Bearing Cup Runout—Inch	Driveshaft Universal Cross-Shaft Runout—Inch
1	0.0045	0.005
2	0.002	0.004
3	0.003	0.003
Average	0.003	0.004

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FIG. 7—Flange Bearing Cup and Cross Shaft Runout Averaging Chart—Typical Readings

tion at the ends of the universal joint bearing cups and the remaining exposed journal of the cross-shaft.

6. Turn the companion flange so that the dial indicator cup-type adapter rests on the machined surface of the bearing cup (Fig. 6). Rotate the companion flange side-to-side slightly to obtain a reading indicating that the bearing cup surface is perpendicular to the indicator cup-type adapter. **This will be the point at which the dial indicator cup is closest to the center of companion flange rotation. It is also the point at which the dial indicator hand will reverse direction as the companion flange is turning.** Set the dial indicator to zero.

7. Carefully retract the dial indicator stem and rotate the companion flange 180 degrees to position the machined surface of the opposite universal bearing under the dial indicator adapter tool. Again, slightly rotate

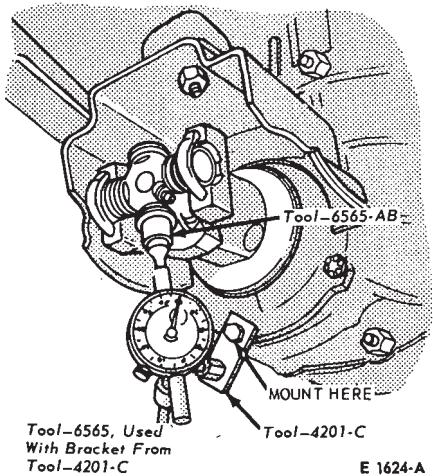


FIG. 8—Cross Shaft Runout Check—Typical

the flange side-to-side to position the bearing perpendicular to the dial indicator adapter. Again, this is the point at which the indicator hand will re-verse direction as the flange is rotated. Record the flange bearing cup runout reading obtained from the indicator (Fig. 7).

Rotate the companion flange 90 degrees and position the dial indicator adapter on the machined end of the exposed journal (Fig. 8). **Be sure the end surface of the exposed journal is perpendicular to the indicator cup-type adapter.** This requires that the cross-shaft be moved fore and aft on the flange bearing cups. Note the point at which the indicator hand reverses direction. Rotate the flange assembly side-to-side until the cross-shaft is perpendicular to the pinion shaft axis, and the indicator hand reverses direction. Zero the dial indicator and check the zero point again by slightly moving the cross-shaft fore and aft, then rotate the companion flange from side-to-side.

8. With the indicator at zero, carefully retract the dial stem and rotate the flange 180 degrees. Rotate the cross-shaft 180 degrees on the flange bearing cups to position the exposed journal under the dial indicator adapter. Rock the cross-shaft fore and aft and the companion flange side-to-side to establish the point at which the indicator hand reverses direction. This will determine the driveshaft universal cross-shaft run-out. Record this reading (Fig. 8).

9. Repeat steps 5 through 8 at least three times and average the indicator readings obtained (Fig. 7).

10. To determine the total (combined) companion flange runout, it will be necessary to use the combined

runout chart (Fig. 9). Position a straight edge at the amount of flange bearing cup runout indicated on the left hand column of the chart. Position another straight edge vertically at the amount of driveshaft universal cross-shaft runout indicated on the top of the chart. The point at which the straight edges cross the chart indicates the combined rear axle flange runout. For example:

With an indicated 0.003 inch flange bearing cup runout and an indicated 0.004 inch universal cross-shaft runout (Fig. 9), the combined companion flange runout will be 0.005 inch as indicated in the square on the chart (Fig. 9).

11. If the reading obtained in Step 10 exceeds specifications, reposition the companion flange 180 degrees on the pinion shaft and repeat steps 1 through 10.

12. If the repeat readings still exceed specifications, re-position the flange an additional 90 degrees on the pinion shaft and check the runout (Steps 4 through 10).

13. If the runout is still excessive, replace the companion flange and check the runout. If necessary, rotate the new flange on the pinion shaft until an acceptable runout is obtained.

If excessive runout is still evident after replacement of the companion flange, it will be necessary to replace the ring and pinion gear, and repeat the above checks until runout is within specifications.

14. Install the driveshaft assembly (Part 15-5). Make sure the universal joint bearing cups are properly positioned between the companion flange lugs.

15. Lower the vehicle. Road test

Flange Bearing Cup Runout	Drive Shaft Universal Cross-Shaft Runout—Inch								
	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008
0.000	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008
0.001	0.001	0.0013	0.0022	0.0032	0.0042	0.0051	0.0061	0.0071	0.0081
0.002	0.002	0.0022	0.0027	0.0037	0.0045	0.0053	0.0062	0.0072	0.0082
0.003	0.003	0.0032	0.0036	0.0042	0.005	0.0058	0.0067	0.0077	0.0085
0.004	0.004	0.0042	0.0045	0.005	0.0057	0.0064	0.0072	0.0081	0.009
0.005	0.005	0.0051	0.0053	0.0058	0.0063	0.0071	0.0078	0.0087	0.0094
0.006	0.006	0.0061	0.0062	0.0068	0.0072	0.0078	0.0085	0.0092	0.010
0.007	0.007	0.0071	0.0073	0.0075	0.0081	0.0087	0.0093	0.0099	0.0103
0.008	0.008	0.0081	0.0082	0.0087	0.009	0.0094	0.010	0.0104	0.011

The total (combined) companion flange runout is located in the square where the columns containing the flange bearing cup runout and universal cross shaft runout readings intersect.

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FIG. 9—Companion Flange Combined Runout Chart

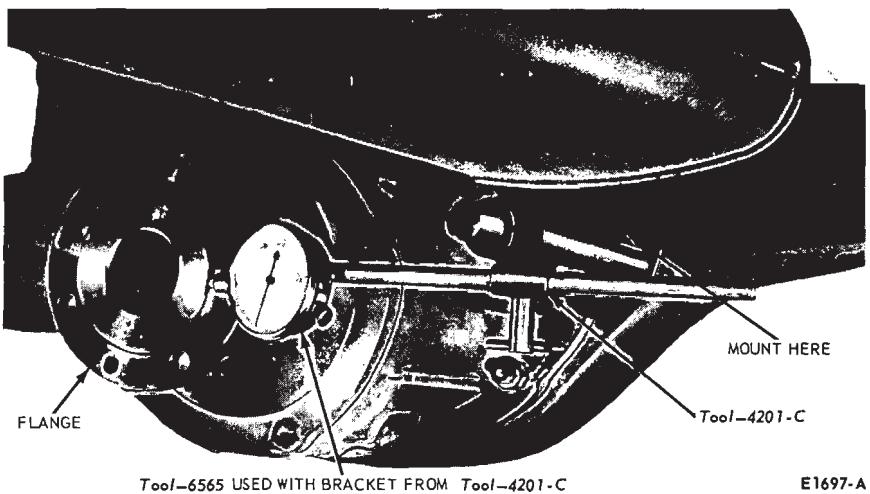


FIG. 10—Checking Companion Flange Radial Runout—Thunderbird, Continental Mark III and Lincoln Continental

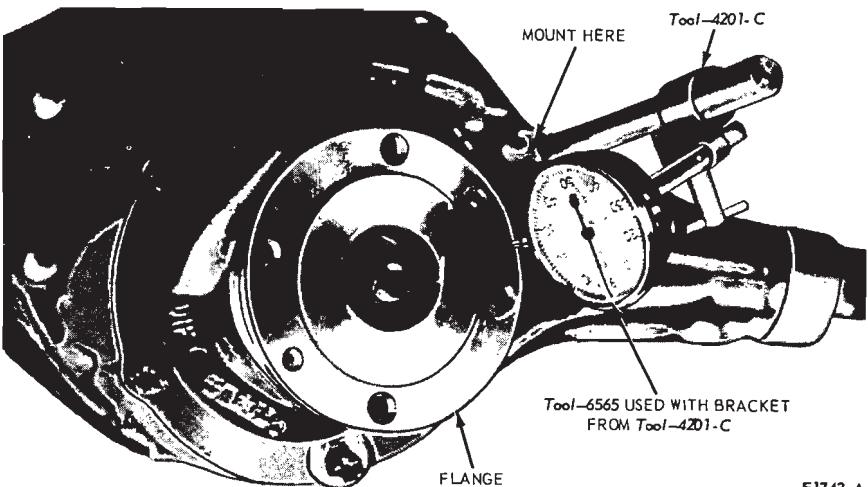


FIG. 11—Checking Companion Flange Lateral Runout—Thunderbird, Continental Mark III and Lincoln Continental

the vehicle. If drive shaft vibrations are evident during the road test, remove the driveshaft from the companion flange and rotate it 180 degrees. Road test the vehicle again.

THUNDERBIRD, LINCOLN CONTINENTAL AND CONTINENTAL MARK III

1. Raise the vehicle on a hoist that supports the rear axle (twin-post hoist).
2. Remove the driveshaft assembly (Part 15-6).
3. Check the companion flange for damage.
4. To check radial runout, set up dial indicator as shown in Fig. 10.
5. Rotate the companion flange with the dial indicator in place. If the runout exceeds specifications, remove the flange and reinstall it 180 degrees from original position. Follow the procedure in Part 15-2 for companion flange installation.
6. If the runout is still excessive, remove and reinstall the flange an additional 90 degrees and recheck runout.
7. To check lateral (face) runout, set up the dial indicator as shown in Fig. 11. Repeat steps 5 and 6.
8. If the runout is still excessive, replace the companion flange and check the runout. If necessary, rotate the new flange on the pinion shaft until an acceptable runout is obtained.
- If excessive runout is still evident after replacement of the companion flange, it will be necessary to replace the ring and pinion gear, and repeat the above checks until runout is within specifications.
9. Install the driveshaft assembly (Part 15-6).

2 COMMON ADJUSTMENTS AND REPAIRS

PINION AND RING GEAR TOOTH CONTACT ADJUSTMENT

Two separate adjustments affect pinion and ring gear tooth contact. They are pinion location and backlash (Figs. 12 and 13).

Individual differences in matching the differential housing and the gear set require the use of shims to locate the pinion for correct contact with the ring gear.

When adjusting either type axle, shim thickness should be increased or reduced only as indicated by the tooth pattern check described in the foregoing Section 1.

If the tooth pattern check indicates a change in backlash only, follow the procedure under Backlash and Differential Bearing Preload Adjustments. If the tooth pattern indicates a change in shim thickness, follow the procedure under Pinion Location.

REMOVABLE CARRIER TYPE AXLE

The shim location for the removable carrier type axle is between the pinion retainer and the carrier (Fig. 13). When adjusting this type carrier reducing shim thickness will move the pinion toward the ring gear; increasing shim thickness will move the pinion away from the ring gear (Fig. 13).

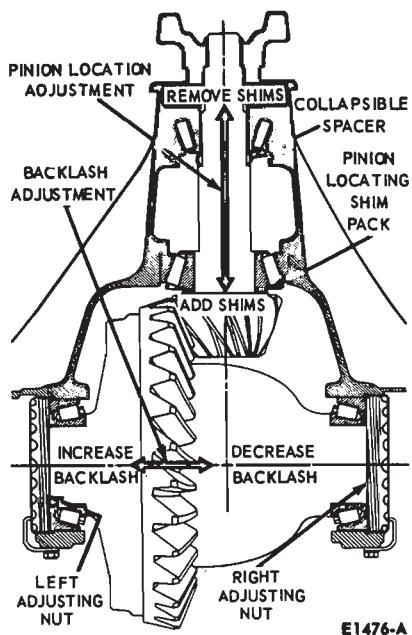


FIG. 12—Pinion and Ring Gear Tooth Contact Adjustment—Integral Carrier Type Axles

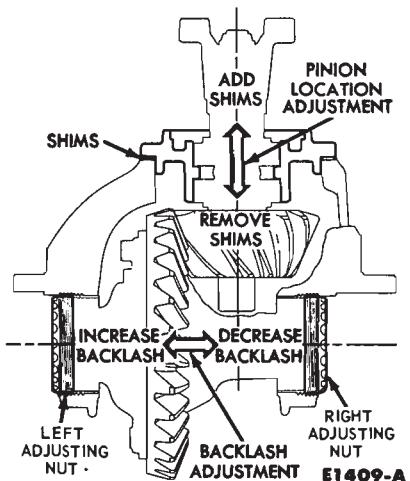


FIG. 13—Pinion and Ring Gear Tooth Contact Adjustment—Removable Carrier Axles

INTEGRAL CARRIER TYPE AXLE

The shim location for the integral carrier type axle, is between the pinion gear and the pinion rear bearing cone (Fig. 12). When adjusting this type axle, **increasing** shim thickness moves the pinion **toward** the ring gear; **reducing** shim thickness moves the pinion **away** from the ring gear (Fig. 12).

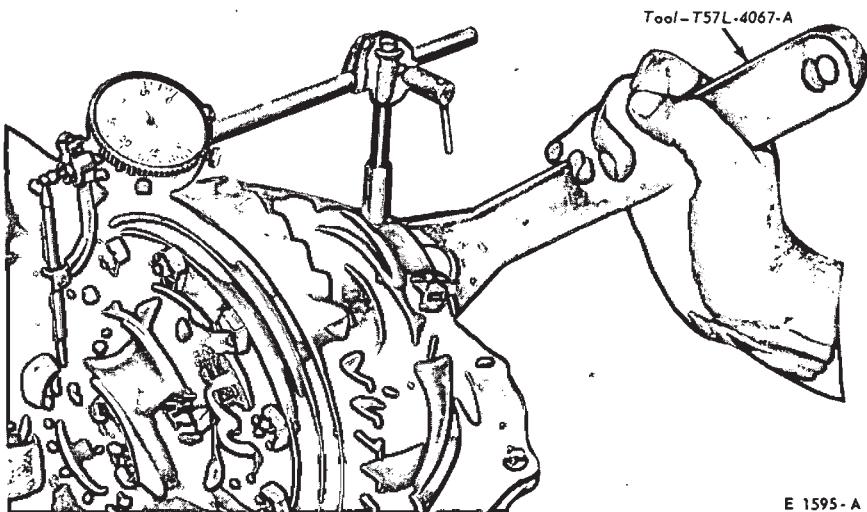


FIG. 14—Adjusting Side Bearing Preload—Typical

BACKLASH AND DIFFERENTIAL BEARING PRELOAD ADJUSTMENTS (ALL AXLES)

On a Light-Duty (WER) Axle, it is necessary to remove the rear axle shaft prior to performing the adjustment procedures. Refer to Rear Axle Shaft Wheel Bearing and Oil Seal Replacement—Light-Duty (WER), Axle, Part 15-4, Section 2.

To secure a more uniform control of differential side bearing preload in service repairs, a dial indicator set-up such as shown in Fig. 14 is used.

In both types of axle (Fig. 12 and 13), the ring gear is moved away from or toward the pinion as described in the following procedure.

1. Remove the adjusting nut locks, loosen the differential bearing cap bolts, then torque the bolts to 15 ft-lbs on integral carrier type axle; 20 ft-lbs on removable carrier type axles before making adjustments.

2. The left adjusting nut is on the ring gear side of the carrier. The right nut is on the pinion side. Loosen the right nut until it is away from the cup. Tighten the left nut until the ring gear is just forced into the pinion with 0.000 backlash then rotate the pinion several revolutions to be sure no binding is evident. (Recheck the right nut at this time to be sure that it is still loose.) **Tightening the left nut moves the ring gear into the pinion to decrease backlash, and tightening the right nut moves the ring gear away.**

3. Install a dial indicator as shown in Fig. 14.

4. Tighten the right nut until it first contacts the bearing cup. Then preload the bearings from 0.008-0.012 inch case spread. Rotate the pinion

gear several revolutions in each direction while the bearings are loaded, to seat the bearings in their cups to be sure no bind is evident. **This step is important.**

5. Again loosen the right nut to release the pre-load. If there is any backlash between the gears as shown by the dial indicator, (Fig. 16) tighten the left nut just enough to remove this backlash. At this time, make sure that one of the slots in the left nut is so located that the lock can be installed without turning the nut. Carefully, tighten the right nut until it just contacts the cup.

6. Torque the differential cap bolts to specification.

On integral carrier type axles, set a preload of 0.008 to 0.012 inch case spread for new bearings and 0.003 to 0.005 for the original bearings.

On removable carrier type axles, the preload is 0.008 to 0.012 inch case spread for new bearings and 0.005 to 0.008 for the original bearings. As preload is applied from the right side, the ring gear is forced away from the pinion and usually results in the correct backlash.

7. Measure the backlash on several teeth around the ring gear. If the measurements vary more than 0.003 inch (both integral and removable carrier) there is excessive runout in the gears or their mountings, which must be corrected to obtain a satisfactory unit. If the backlash is out of specification, loosen one adjusting nut and tighten the opposite nut an equal amount, to move the ring gear away from or toward the pinion. **When moving the adjusting nuts, the final movement should always be made in a tightening direction. For example, if the left nut had to be loosened one**

notch, loosen the nut two notches, then tighten it one. This insures that the nut is contacting the bearing cup, and that the cup cannot shift after being put in service. After all such adjustments, check to be sure that the case spread remains as specified for the new or original bearings used.

8. Again check the tooth contact pattern. If the pattern is still incorrect, a change in pinion location (shim thickness) is indicated.

PINION LOCATION

Removable Carrier Type Axle

1. Remove the attaching bolts and the pinion and bearing retainer assembly from the carrier.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in Section 1.

3. Replace the pinion retainer O-ring (Fig. 39, Part 15-2). Coat the O-ring with axle lubricant before installing. **Do not roll the O-ring into the groove. Snap it into position.**

4. Being careful not to pinch the O-ring, install the pinion and bearing retainer assembly in the carrier with the corrected shim pack.

Before installing the pinion and bearing retainer assembly, determine

which type of gear set is being used. The **non-hunting** and **partial non-hunting** types can be identified by the paint timing marks on the gear teeth (Fig. 3).

If the gear set is of the **non-hunting** or **partial non-hunting** type clean the teeth on both the pinion and drive gear so that the timing marks are visible. Rotate the differential case and ring gear assembly in the carrier until the marked teeth on the ring gear are opposite the pinion entry hole. Place the assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 3).

In almost every case of improper assembly (gear assembled out of time) the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type gear set (no timing marks), assemble the pinion and retainer assembly into the carrier without regard to the matching on any particular gear teeth.

5. Install the retainer-to-carrier mounting bolts and torque to specifications.

6. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedures.

7. Make a tooth pattern check. If

the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

Integral Carrier Type Axle

1. Remove the differential case and the drive pinion from the carrier casting, and then remove the pinion bearings as described under Removal of Differential Case and Drive Pinion in Section 4.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in the foregoing Section 1 and shown in Fig. 4.

3. Install the corrected shim pack and the bearings on the pinion, and then install the pinion and the differential case in the carrier casting as outlined under Installation of Drive Pinion and Differential Case in Section 4 of Part 15-3.

4. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedure.

5. Make a tooth pattern check. If the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

2 CLEANING AND INSPECTION

INSPECTION BEFORE DISASSEMBLY OF CARRIER (ALL AXLES)

The differential case or carrier should be inspected before any parts are removed from it. These inspections can help to find the cause of the trouble and to determine the corrections needed.

Mount the carrier in the holding fixture shown in Fig. 15. Wipe the lubricant from the internal working parts, and visually inspect the parts for wear or damage.

Rotate the gears to see if there is any roughness which would indicate damaged bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear.

Set up a dial indicator (Fig. 16) and check the backlash at several points around the ring gear. Backlash should be within specifications.

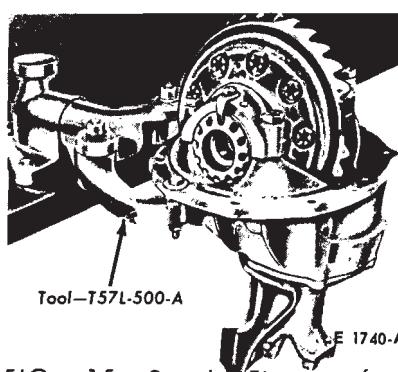


FIG. 15—Bench Fixture for Removable Carrier Overhaul—Typical

If no obvious defect is noted, check the gear tooth contact.

To check the gear tooth contact, paint the gear teeth with the special compound furnished with each service ring gear and pinion. A mixture that

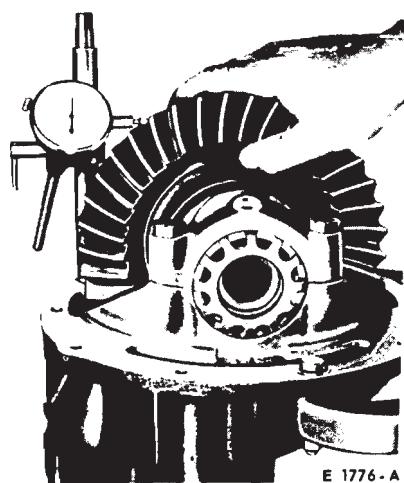
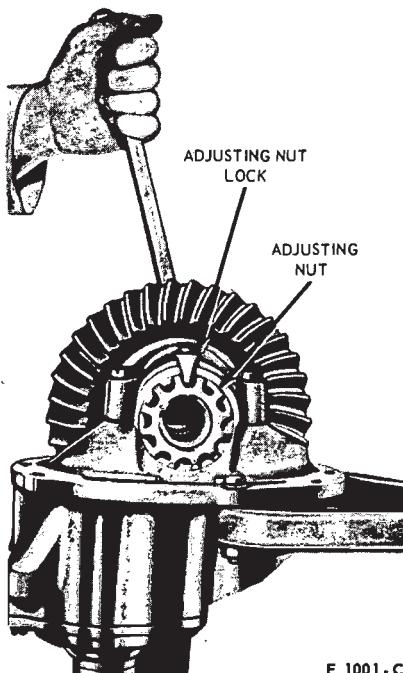
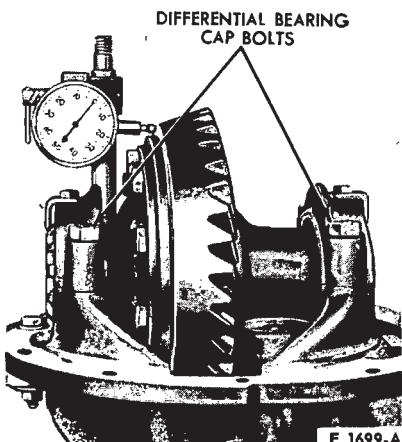


FIG. 16—Backlash Check—Typical



E 1001-C

FIG. 17—Checking Gear Tooth Contact—Typical



E 1699-A

FIG. 18—Checking Ring Gear Runout—Typical

is too wet will run and smear. Too dry a mixture cannot be pressed out from between the teeth.

As shown in Fig. 17, rotate the ring gear (use a box wrench on the ring gear attaching bolts for a lever) five complete revolutions in both directions or until a clear tooth contact pattern is obtained.

Certain types of gear tooth contact patterns on the ring gear indicate incorrect adjustment. Noise caused by incorrect adjustment can often be corrected by readjusting the gears. Acceptable patterns and the necessary corrections are explained under Tooth

Contact Pattern Check in Section 1.

Gear tooth runout can sometimes be detected by an erratic pattern on the teeth. However, a dial indicator should be used to measure the runout of the back face of the ring gear as shown in Fig. 18. If this runout exceeds specifications, disassemble the carrier and replace necessary parts as indicated in Part 15-2, Section 4 and Part 15-3, Section 4.

Loosen the differential bearing cap bolts, and then torque them to 25 ft-lbs. Remove the adjusting nut locks. Carefully loosen one of the adjusting nuts to determine if any differential bearing preload remains. If any preload remains, the differential bearings may be re-used, provided they are not pitted or damaged.

INSPECTION AFTER DISASSEMBLY OF CARRIER (ALL AXLES)

Thoroughly clean all parts. Synthetic seals must not be cleaned, soaked or washed in cleaning solvents. Always use clean solvent when cleaning bearings. Oil the bearings immediately after cleaning to prevent rusting. Inspect the parts for defects. Clean the inside of the carrier before rebuilding it. When a scored gear set is replaced, the axle housing should be washed thoroughly and steam cleaned. This can only be done effectively if the axle shafts and shaft seals are removed from the housing. Inspect individual parts as outlined below.

GEARS

Examine the pinion and ring gear teeth for scoring or excessive wear. Extreme care must be taken not to damage the pilot bearing surface of the pinion.

The pattern taken during disassembly should be helpful in judging if gears can be re-used. Worn gears cannot be rebuilt to correct a noisy condition. Gear scoring is the result of excessive shock loading or the use of an incorrect lubricant. Scored gears cannot be re-used.

Examine the teeth and thrust surfaces of the differential gears. Wear on the hub of the differential gear can cause a chucking noise known as chuckle when the vehicle is driven at low speeds. Wear of splines, thrust surfaces, or thrust washers, can contribute to excessive drive line backlash.

BEARING CUPS AND CONE AND ROLLER ASSEMBLIES

Check bearing cups for rings, scores, galling, or excessively worn wear patterns. Pinion cups must be solidly seated. Check by attempting to insert a 0.0015-inch feeler between these cups and the bottoms of their bores.

When operated in the cups, cone and roller assemblies must turn without roughness. Examine the roller ends for wear. Step-wear on the roller ends indicates the bearings were not preloaded properly, or the rollers were slightly misaligned.

If inspection reveals either a worn cup or a worn cone and roller assembly, both parts should be replaced to avoid early failure.

DIFFERENTIAL BEARING ADJUSTING NUTS

Temporarily install the bearing caps and test the fit of the adjusting nuts in their threads. The nuts should turn easily when the caps are tightened to 25 ft-lbs. The faces of the nuts that contact the bearing cups must be smooth and square. Replace the nuts or examine the threads in the carrier if their fit is not proper. Be sure that the bearing caps and adjusting nuts are on the side they were machined to fit. Observe the punch marks and scribe marks made during disassembly.

U-JOINT FLANGE

Be sure that the ears of the flange have not been damaged in removing the drive shaft or in removing the flange from the axle. The end of the flange that contacts the front pinion bearing inner race as well as the flat surface of the pinion nut counterbore must be smooth. Polish these surfaces if necessary. Roughness aggravates backlash noises and causes wear of the flange and pinion nut with a resultant loss in pinion bearing preload.

PINION RETAINER

Be sure that the pinion bearing cups are seated. Remove any chips or burrs from the mounting flange. Clean the groove for the O-ring seal and all lubricant passages. If the cups were removed, examine the bores carefully. Any nicks or burrs in these bores must be removed to permit proper seating of the cups.

CARRIER HOUSING

Make sure that the differential bearing bores are smooth and the threads are not damaged. Remove any nicks or burrs from the mounting surfaces of the carrier housing.

DIFFERENTIAL CASE

Make sure that the hubs where the bearings mount are smooth. Carefully examine the differential case bearing shoulders, which may have been damaged when the bearings were removed. The bearing assemblies will fail if they do not seat firmly against the shoulders. Check the fit (free rotation) of the differential side gears in their counterbores. Be sure that the mating surfaces of the two parts of the case are smooth and free from nicks or burrs.

TRACTION-LOK DIFFERENTIAL PARTS

Inspect the clutch plates for uneven or extreme wear. The dog-eared clutch plates must be free from burrs, nicks or scratches which could cause excessive or erratic wear to the bonding material of the internally splined clutch plates. The internally splined clutch plates should be inspected for condition of the bond, bonding material, and wear. Replace the bonded plates if their thickness is less than 0.085 inch or if the bonded material is scored or badly worn. Inspect the bonded plate internal teeth for wear. Replace them, if excessive wear is evident. **Bonded plates should be replaced as a set only.**

Examine all thrust surfaces and hubs for wear. Abnormal wear on these surfaces can contribute to a

noisy axle.

LUBRICANT LEVEL

The lubricant level should be checked every 6000 miles with the vehicle in normal curb attitude. The lubricant level should be at the lower edge of the filler plug hole with the following exceptions: The WER axle lubricant level should be 1/2 inch below the lower edge of the filler plug hole and the 7 1/4 inch ring gear axle lubricant level should be 1/4 inch below the lower edge of the filler plug hole. It is unnecessary to periodically drain the axle lubricant. The factory fill should remain in the housing for the life of the vehicle, except when repairs are made. The specified lubricant should be installed when the axle is overhauled.

4 SPECIAL TOOLS

Tool Number	Description	Usage	Tool Number	Description	Usage
T50T-100-A	Impact Slide Hammer	①	T68P-4602-AB	Vial	①
T57L-500-A	Bench Mounted Holding Fixture	①	T68P-4602-AC	Magnet	①
TOOL-1175-AB	Grease Seal Remover (Use with Slide Hammer T50T-100-A)	①	T57L-4614-A	Drive Pinion and Drive Pinion Retainer Assembly Support	①
TOOL-1177	Axle Shaft Oil Seal Replacer	④	TOOL-4615-G	Drive Pinion Front Bearing Cup—Remover	⑥
T65F-1177-A	Axle Shaft Oil Seal Replacer	④	T55P-4616-A	Drive Pinion Bearing Cup Remover and Replacer	③
T66N-1177-A	Axle Shaft Oil Seal Replacer	④	T56T-4616-A	Drive Pinion Bearing Cup Replacer Adapters	③
T60K-1177-B	Rear Wheel Bearing Oil Seal Replacer	④	T57L-4616-A	Drive Pinion Bearing Cup Remover and Replacer	③
T60K-1225-A	Rear Axle Shaft Bearing Remover and Replacer	④	T60K-4616-A	Pinion Bearing Cups Replacer (Inner and Outer)	⑤
TOOL-1225-DA	Axle Shaft Bearing Remover	④	T67P-4616-A	Pinion Bearing Cups Replacer	④ ⑤
TOOL-4000-C	Differential Housing Spreader	①	T69P-4621-A	Pinion Bearing Cone Replacer (Front and Rear)	①
T57L-4067-A	Differential Bearing Adjuster Wrench	①	T57L-4625-A	Drive Pinion Pilot Bearing and Retaining Ring Remover and Replacer	③ ⑪
T60K-4067-A	Differential Bearing Adjuster Nut Wrench	④	T62F-4625-A	Drive Pinion Pilot Bearing and Retaining Ring Remover and Replacer	⑤
TOOL-4201-C	Differential Backlash and Runout Gauge, With Universal Bracket Dial Indicator and Bracket	①	TOOL-4625-AA	Drive Pinion Bearing Cup—Rear Remover	③
T59L-4204-A	Locking Differential Torque Check	③ ④ ⑦ ⑧	TOOL-4625-AB	Drive Pinion Bearing Cup—Rear Replacer	③
T65K-4204-A	Locking Differential Torque Check	③ ⑦ ⑧	TOOL-4625-K	Drive Pinion Pilot Bearing—Remover and Replacer	③
T66L-4204-A	Locking Differential Torque Check	③ ⑩	TOOL-4625-L	Drive Pinion Rear Bearing Cup Remover	③
T57L-4220-A	Differential Bearing Assembly Remover	④ ⑤	T55P-4676-A	Companion Flange Oil Seal Replacer	③
T66P-4220-A	Remover—Differential Bearing Assembly	③ ⑩	T58L-4676-A	Companion Flange Oil Seal Replacer	①
T57L-4221-A	Differential Side Bearing Cone Replacer	①	T62F-4676-A	Drive Pinion Oil Seal Replacer	③
TOOL-4221-AF	Differential Bearing Cone Remover—Pilot (Use with TOOL-4221-C)	①	T65L-4851-A	Flange (Universal Joint) Axle End Remover	①
TOOL-4221-AH	Differential Bearing Cone—Remover Conventional Axle	③	T68P-4851-A	Universal Joint—Flange Holder	④
TOOL-4221-AJ	Differential Bearing Cone Remover	④	TOOL-4851-K	Universal Joint—Flange Holder	③ ⑤
TOOL-4221-AL	Differential Bearing Cone Remover—Pilot (Use With 4221-C)	④	TOOL-4858-E	Companion Flange and Pinion Bearing Replacer	③
TOOL-4221-C	Differential Side Bearings Remover	①	T68P-4946-A	Locking Differential Gauge (Traction-Lok Clutch Pack)	①
TOOL-4222-H	Differential Bearing Cones Replacer		T69P-2B384-A	Rotor Remover and Installer—Brake Skid Control	③
TOOL-4222-L	Differential Side Bearing Cones Replacer	④	CJ91B	Universal Joint Bearing Replacer	①
T66L-4234-A	Rear Axle Shaft Assembly Remover Adapter (Use with T50T-100-A)	①			
T68P-4602-A	Pinion Angle Level Gauge	①			
T68P-4602-AA	Frame	①			
T90P-4067-A	Differential Bearing Adjuster Nut Wrench	①			

① All
 ② Ford, Meteor
 ③ Ford, Mercury, Lincoln Continental, Thunderbird, Continental Mark III
 ④ Lincoln Continental, Continental Mark III, Thunderbird
 ⑤ Falcon, Mustang, Maverick, Montego, Fairlane, Cougar
 ⑥ Lincoln Continental

⑦ 7 1/4 Inch Ring Gear
 ⑧ 8 Inch Ring Gear
 ⑨ 8.7 Inch Ring Gear
 ⑩ 9 Inch Ring Gear
 ⑪ 9 3/8 Inch Ring Gear

PART 15-02 Driving Axles—Removable Carrier Type

COMPONENT INDEX Applies Only to Models Indicated	All Models	Ford	Mercury	Meteor	Cougar	Fairlane	Falcon	Maverick	Montego	Mustang	Lincoln- Continental	Thunderbird	Continental- Mark III
AXLE HOUSING (Coil Spring Suspension)													
Cleaning and Inspection	01-09	01-09	01-09	N/A	N/A	N/A	N/A	N/A	N/A	01-09	01-09	01-09	
Removal and Installation	02-09	02-09	02-09	N/A	N/A	N/A	N/A	N/A	N/A	02-09	02-09	02-09	
AXLE HOUSING (Leaf Spring Suspension)													
Cleaning and Inspection	N/A	N/A	N/A	01-09	01-09	01-09	01-09	01-09	01-09	N/A	N/A	N/A	
Removal and Installation	N/A	N/A	N/A	02-11	02-11	02-11	02-11	02-11	02-11	N/A	N/A	N/A	
AXLE SHAFT													
Cleaning and Inspection	01-10												
Removal and Installation	02-04												
CONVENTIONAL DIFFERENTIAL													
Cleaning and Inspection	01-10												
Disassembly and Overhaul	02-13												
Removal and Installation	02-09												
DIFFERENTIAL BEARINGS AND RING GEAR													
Adjustment	02-16												
Cleaning and Inspection	01-10												
Removal and Installation	02-13												
DIFFERENTIAL CARRIER													
Cleaning and Inspection	01-10												
Disassembly and Overhaul	02-13												
Removal and Installation	02-09												
PILOT BEARING													
Cleaning and Inspection	01-10												
Removal and Installation	02-15												
PINION AND RING GEAR													
Cleaning and Inspection	01-10												
Removal and Installation	02-15												
PINION BEARING													
Cleaning and Inspection	01-10												
Removal and Installation	02-15												
PINION BEARING RETAINER													
Cleaning and Inspection	01-10												
Removal and Installation	02-15												
PINION SPACER (Collapsible)													
Removal and Installation	02-17	N/A	02-17	02-17	02-17	02-17	N/A	02-17	02-17	N/A	N/A	N/A	
PINION OIL SEAL													
Removal and Installation	02-07												

A page number indicates that the item is for the vehicle listed at the head of the column.
 N/A indicates that the item is not applicable to the vehicle listed.

COMPONENT INDEX Applies Only to Models Indicated	All Models	Ford	Mercury	Meteor	Cougar	Fairlane	Falcon	Maverick	Montego	Mustang	Lincoln- Continental	Thunderbird	Continental- Mark III
PINION SPACER (Solid) Determining Spacer Size	02-18												
Removal and Installation	02-18												
REAR WHEEL BEARINGS AND SEALS													
Cleaning and Inspection	01-10												
Removal and Installation	02-04												
TRACTION-LOK DIFFERENTIAL													
Cleaning and Inspection	01-11	01-11	01-11	01-11	01-11	N/A	N/A	01-11	01-11	01-11	01-11	01-11	01-11
Description	02-02	02-02	02-02	02-02	02-02	N/A	N/A	02-02	02-02	02-02	02-02	02-02	02-02
Disassembly and Overhaul	02-13	02-13	02-13	02-13	02-13	N/A	N/A	02-13	02-13	02-13	02-13	02-13	02-13
Removal and Installation	02-13	02-13	02-13	02-13	02-13	N/A	N/A	02-13	02-13	02-13	02-13	02-13	02-13
U-JOINT FLANGE													
Cleaning and Inspection	01-10												
Removal and Installation	02-08												

A page number indicates that the item is for the vehicle listed at the head of the column.
N/A indicates that the item is not applicable to the vehicle listed.

1 DESCRIPTION

CONVENTIONAL AXLE

The rear axle is of the banjo-housing, hypoid gear type using an 8, 8 3/4, 9 or 9 3/8 inch ring gear, in which the centerline of the pinion is mounted below the centerline of the ring gear (Fig. 1).

The pinion gear and the pinion bearings are assembled in a pinion retainer, which is bolted to the carrier. The pinion is straddle mounted; that is, it is supported by bearings both in front of and to the rear of the pinion gear. Two opposed tapered roller bearings support the pinion shaft in front of the pinion gear with a collapsible spacer for 8 inch, 8-3/4 inch or 9 inch ring gear, and a solid spacer used with the 9 3/8 inch ring gear. A straight roller (pilot) bearing supports the pinion shaft at the rear of the pinion gear. Pinion and ring gear tooth contact is adjusted by adding or removing shims from between the pinion retainer and the carrier housing.

The differential assembly is mounted on two opposed tapered roller bearings, which are retained in the carrier by removable caps. The entire carrier assembly is bolted to the axle housing.

Ball bearing assemblies (rear wheel bearings) are pressed onto the outer ends of the axle shafts and set in the outer ends of the axle housing. These bearings support the semi-floating axle shafts at the outer ends. The inner ends of the shafts spline to the differential side gears. Bearing retainer plates hold the shafts in the housing. The left and right axle shafts are not interchangeable, the left shaft being shorter than the right.

An identification tag (Fig. 2) is secured to the axle assembly by one of the carrier-to-housing bolts.

It is important to use the axle model designation if necessary to obtain correct replacement parts.

TRACTION-LOK DIFFERENTIAL

The axle assembly, except for the differential case and its internal components, is identical to the conventional axle.

The Traction-Lok differential (Fig. 3) employs a multiple disc clutch to control differential action. Shim(s), which control side gear mounting distance, four steel, four friction and one composite plate (steel on one side and friction material on the other) stacked on a clutch hub, and four ear guides are housed in the differential cover. Located in the differential case between the side gears is a one-piece pre-load plate and block and four calibrated pre-load springs, which apply an initial force to the clutch pack. Additional clutch capacity is derived from the side gear thrust loads. The four friction plates are splined to the clutch hub which in turn is splined to the left axle shaft, and the eared steel plates are dogged to the case; thus, the clutch is always engaged.

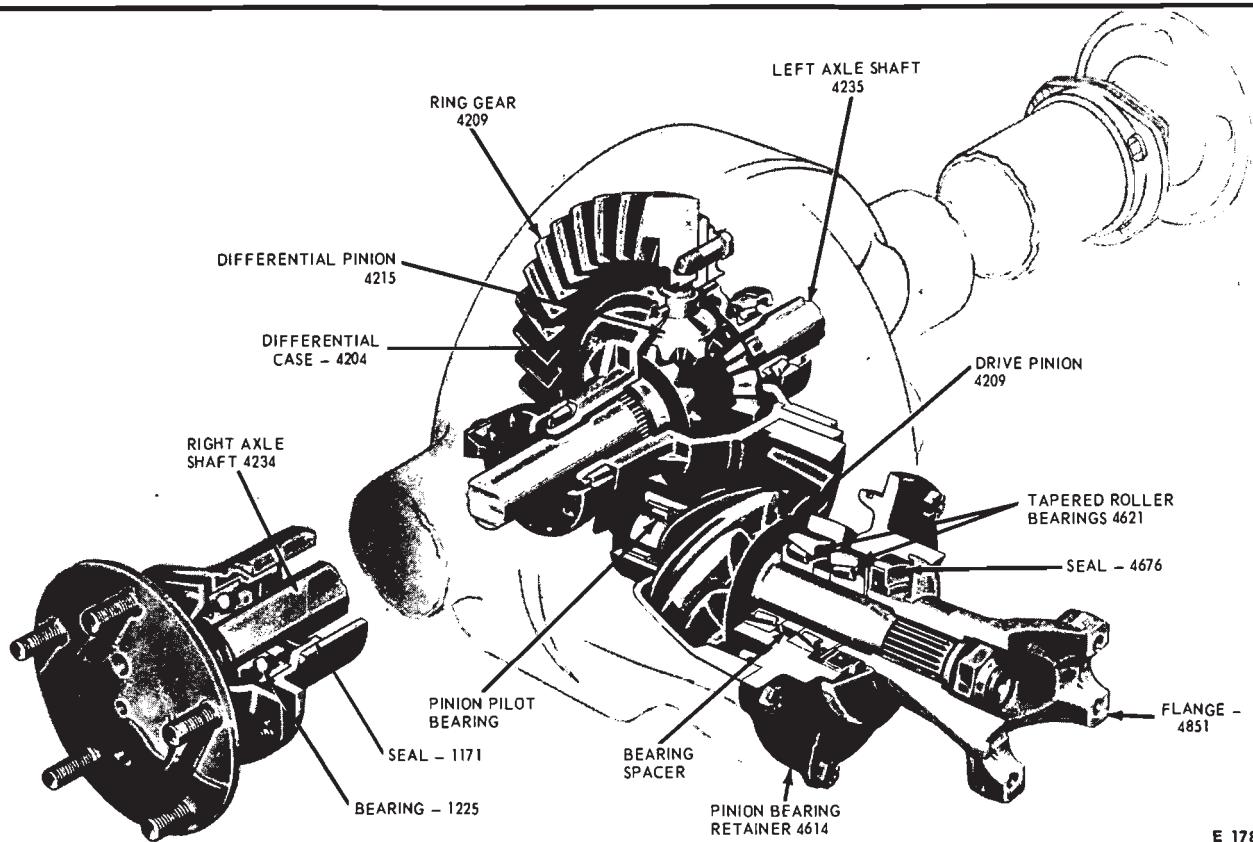
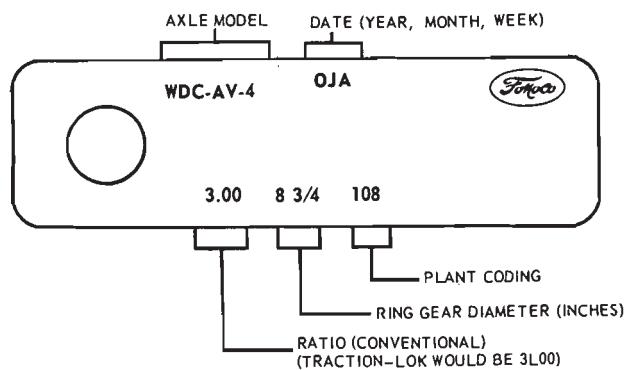
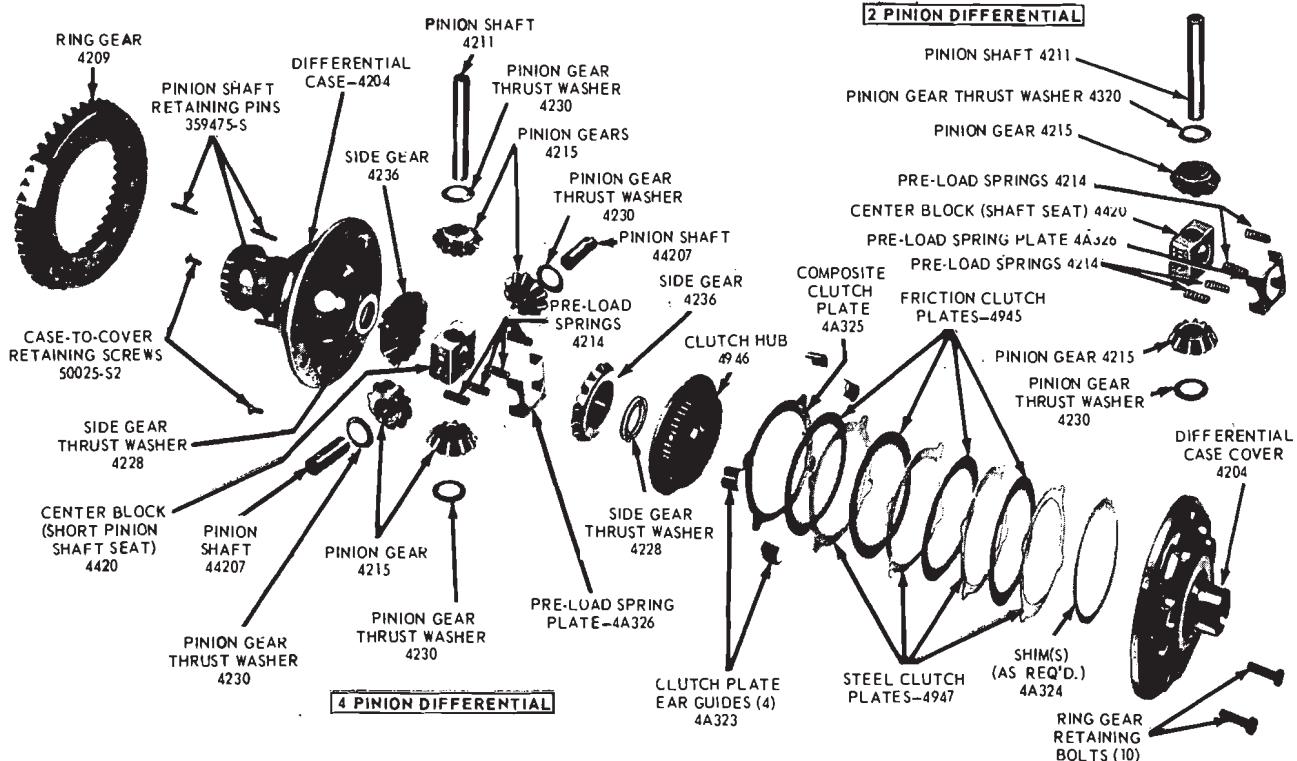


FIG. 1—Rear Axle Assembly—Removable Carrier Type—Typical



E 1918-B

FIG. 2—Rear Driving Axle Model Identification Tag



E 1926-B

FIG. 3—Traction-Lok Differential

2 IN-VEHICLE ADJUSTMENTS AND REPAIRS

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

The rear axle shafts, wheel bearings, and oil seal can be replaced without removing the differential assembly from the axle housing.

REMOVAL OF AXLE SHAFT

Synthetic wheel bearing seals are used. Removal and insertion of rear axle shafts must be performed with caution. The entire length of the shaft (including spline) up to the seal journal must pass through the seal without cutting of the seal element during axle removal or installation will result in early seal failure.

1. Remove the wheel cover, wheel and tire from the brake drum.

2. Remove the nuts that secure the brake drum to the axle shaft flange, then remove the drum from flange.

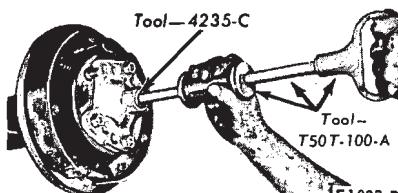


FIG. 4—Removing Axle Shaft

Disconnect the sure-track brake sensor wiring connector, if so equipped, and remove the nuts which retain the sensor to the backing plate. (Lincoln Continental, Continental Mark III, or Thunderbird).

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the wheel bearing retainer plate. Then pull the axle shaft assembly out of the axle housing (Fig. 4). The brake backing plate must not be dislodged. Install one nut to hold the plate in place after the axle shaft is removed.

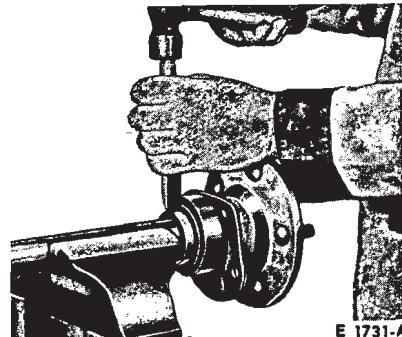


FIG. 5—Removing Rear Wheel Bearing Retainer Ring

REMOVAL OF REAR WHEEL BEARING AND SEAL

Synthetic seals must not be cleaned, soaked or washed in cleaning solvents.

Removal of the wheel bearings from the axle shaft makes them unfit

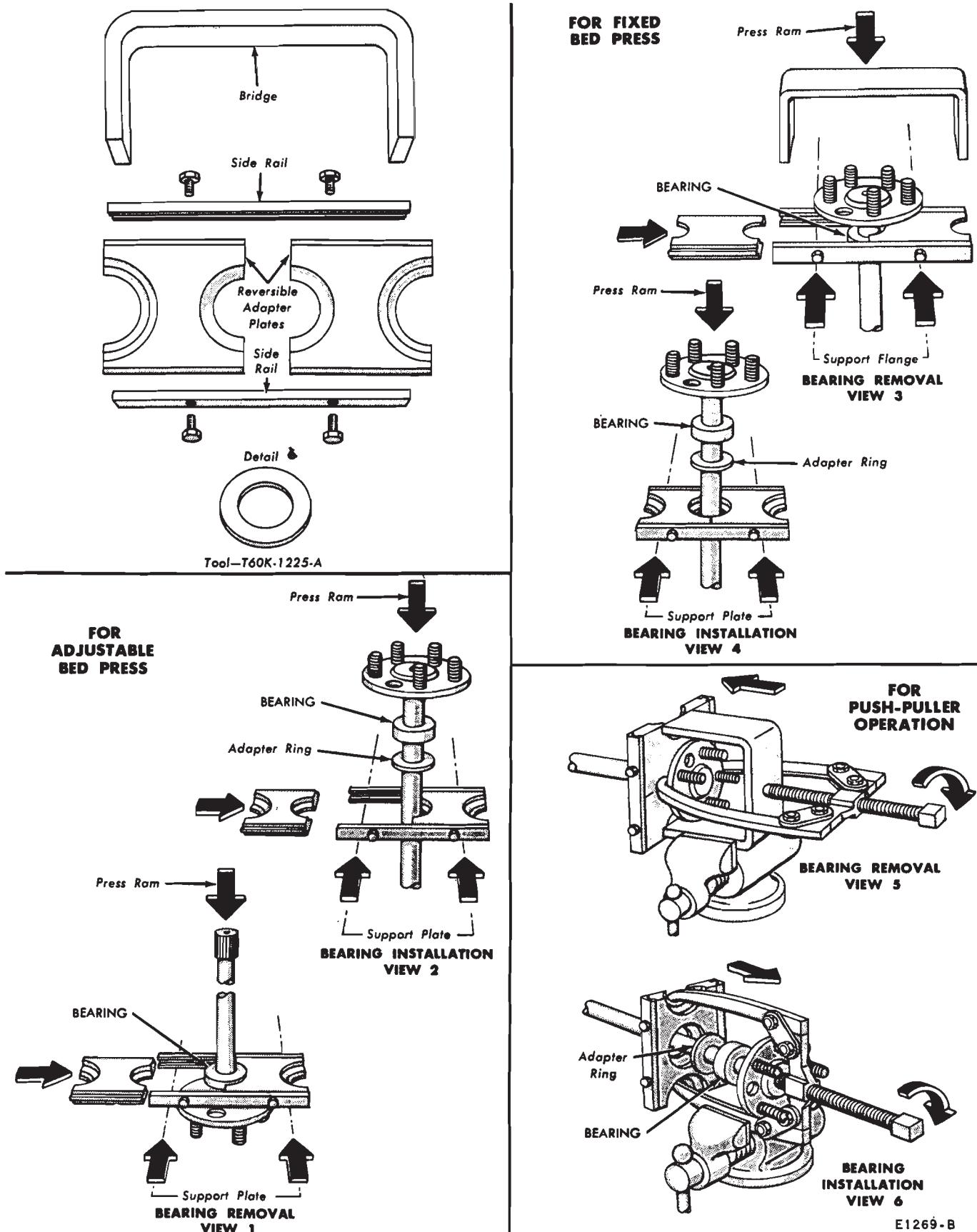


FIG. 6—Removing and Installing Wheel Bearing

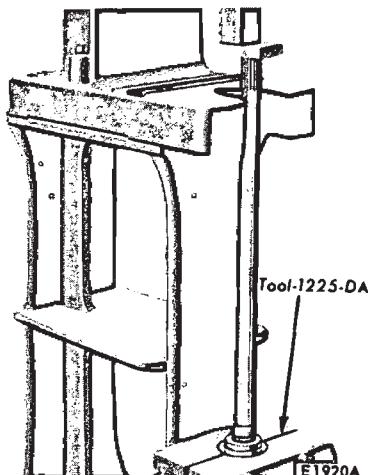


FIG. 7—Removing Wheel Bearing

for further use:

1. On all models except Ford, Mercury or Meteor, if the rear wheel bearing is to be replaced, loosen the inner retainer ring by nicking it deeply with a cold chisel in several places (Fig. 5). It will then slide off easily.

On Ford, Mercury and Meteor models, it is necessary to first drill a $\frac{1}{4}$ inch hole not more than $\frac{5}{16}$ inch deep in the retainer ring surface before using the cold chisel.

2. Remove the bearing from the axle shaft with the tool shown in Fig. 6 or Fig. 7.

3. If the axle shaft is to be replaced, and if equipped with Sure-Track brakes (Lincoln Continental, Continental Mark III and Thunderbird), press the rotor off the shaft as shown in Fig. 8.

4. Whenever a rear axle shaft is replaced, the oil seal must be replaced. Remove the seal with Tool 1175-AB and a slide hammer (Fig. 9).

INSTALLATION OF REAR WHEEL BEARING AND SEAL

1. Inspect the machined surface of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or twist. Carefully remove any burrs or rough spots. Replace worn or damaged parts.

2. If the Sure-Track brake rotor (on vehicles so equipped) was removed, press the rotor on the axle shaft as shown in Fig. 10.

3. Lightly coat wheel bearing bores with axle lubricant.

4. Place the Sure-Track brake sen-

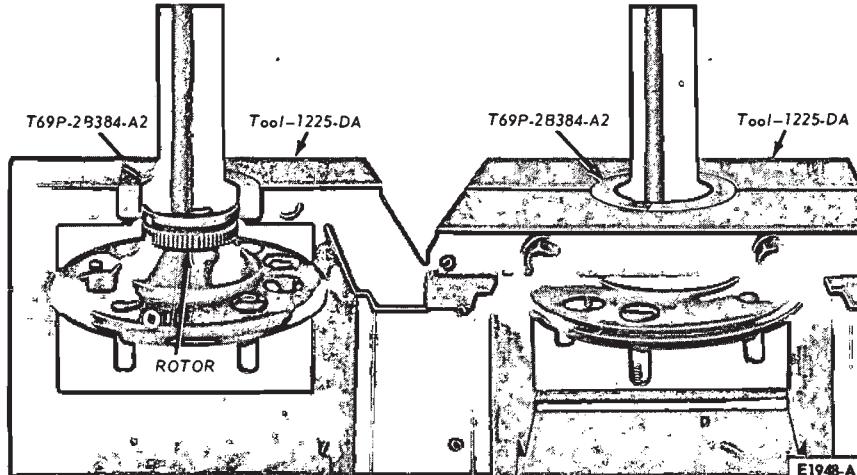


FIG. 8—Sure-Track Brake Rotor Removal

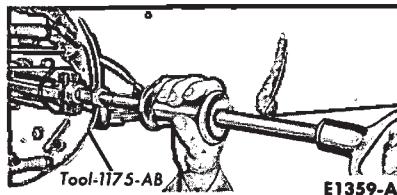


FIG. 9—Removing Rear Wheel Bearing Oil Seal

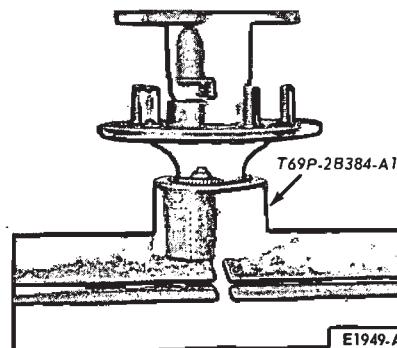


FIG. 10—Sure-Track Brake Rotor Installation

sor (if so equipped) and the bearing retainer plate on the axle shaft, and press the new wheel bearing on the shaft with the tool shown in Fig. 6 or Fig. 11. Do not attempt to press on both the bearing and the inner retainer ring at the same time.

5. Using the bearing installation tool (Tool 4621-A), press the bearing inner retainer ring on the shaft until the retainer seats firmly against the bearing. On Ford, Mercury, or Meteor models, before assembling the retainer onto the axle shaft, the shaft journal and the inside diameter of the retainer should be wiped clean with a dry cloth. These parts must not be degreased or lubricated.

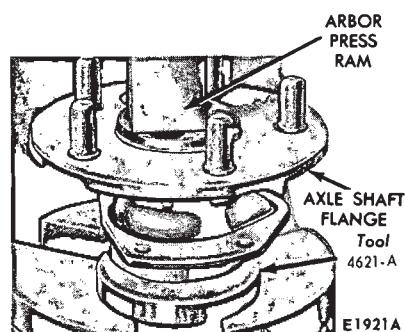


FIG. 11—Installing Wheel Bearing

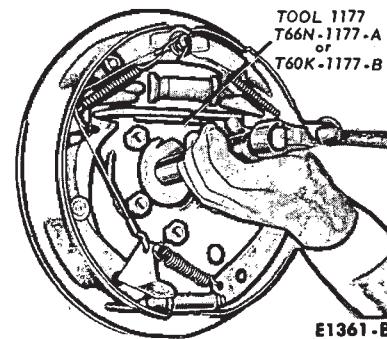


FIG. 12—Installing Rear Wheel Bearing Oil Seal

6. Install the new oil seal with the tools shown in Fig. 12. Wipe a small amount of oil resistant sealer on the outer edge of the seal before it is installed. Do not put sealer on the sealing lip.

INSTALLATION OF AXLE SHAFT

1. Carefully slide the axle shaft into the housing so that the rough

forging of the shaft will not damage the oil seal. Start the axle splines into the side gear, and push the shaft in until the bearing bottoms in the housing.

2. Install the bearing retainer plate and the nuts that secure it. Torque the nuts to specifications.

3. If equipped with Sure-Track brakes, route the sensor wiring through its grommet in the brake backing plate and connect the wiring connector. Install the sensor retaining nuts.

4. Install the brake drum and the drum attaching (Tinnerman) nuts.

5. Install the wheel and tire on the drum. Install the wheel cover.

DRIVE PINION OIL SEAL REPLACEMENT

COLLAPSIBLE SPACER

Synthetic seals must not be cleaned, soaked or washed in cleaning solvent.

The drive pinion oil seal can be replaced without removing the differential carrier assembly from the axle housing.

1. Raise the vehicle and install safety stands. Remove both rear wheels and brake drums.

2. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly. Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission fluid leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. Scribe the pinion shaft and the U-joint flange inner surface for assembly realignment. While holding the flange with the tool shown in Fig. 21, Fig. 22 or Fig. 23, remove the integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear.

6. Using the tool shown in Fig. 24, remove the U-joint flange.

7. Using the tool shown in Fig. 25 remove the drive pinion oil seal.

8. Clean the oil seal seat.

9. Install the new seal in the retainer, using the applicable tool shown in Fig. 46.

10. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in a rotational motion. Wipe the pinion shaft clean.

11. Apply a small amount of lubricant to U-joint splines.

Align scribe marks on U-joint flange and pinion shaft.

12. Install the U-joint flange using the tool shown in Fig. 45.

13. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut).

14. Hold the flange with the tool shown in Fig. 21, Fig. 22 or Fig. 23 while tightening nut.

15. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

16. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 8 to 14 in-lb over the original reading is reached. The preload should not exceed 8 to 14 in-lb over the original reading, or bearing failure may result. Under no circumstances should the pinion nut be backed off to lessen preload. If this is done, a new pinion bearing spacer must be installed. In addition, the U-joint flange must never be hammered on, or pneumatic tools used.

17. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

18. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange.

19. Check the lubricant level. Make sure the axle is in running position. Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

SOLID SPACER

The drive pinion oil seal can be replaced without removing the differen-

tial carrier assembly from the axle housing.

1. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly. Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

2. Make punch marks on the end of the pinion shaft and the U-joint flange inner surface for realignment. While holding the flange with the tool shown in Fig. 21, Fig. 22 or Fig. 23, remove the integral pinion nut and washer.

3. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear.

4. Using the tool shown in Fig. 24 remove the U-joint flange.

5. Using the tool shown in Fig. 25 remove the drive pinion oil seal.

6. Clean the oil seal seat.

7. Install the new seal in the retainer, using the applicable tool shown in Fig. 46.

8. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them with a fine crocus cloth, working in a rotational motion, then wipe clean. Apply a small quantity of lubricant to U-joint splines.

9. Install the U-joint flange using the tool shown in Fig. 45.

10. Install a new integral attaching nut and washer on the pinion shaft.

11. Tighten the pinion attaching nut, rotating the pinion several times to seat the bearing, then torque the pinion nut to 180-200 ft-lbs. Hold the flange with the tool shown in Fig. 21, Fig. 22 or Fig. 23 while the nut is being tightened.

12. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

13. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange.

14. Check the lubricant level, and add whatever amount of specified lu-

bricant is necessary to reach the lower edge of the filler plug hole. Make sure the axle is in running position when the level is checked.

ORIGINAL U-JOINT FLANGE (IN VEHICLE REPLACEMENT)

Use procedure as outlined under Drive Pinion Oil Seal Replacement.

Synthetic seals must not be cleaned, soaked or washed in cleaning solvent.

INSTALLATION OF A NEW UNIVERSAL JOINT FLANGE

COLLAPSIBLE SPACER

1. Raise the vehicle and install safety stands. Remove both rear wheels and brake drums.

2. Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission fluid leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 21, 22 or Fig. 23, remove the integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear. Synthetic seals must not be cleaned, soaked or washed in cleaning solvent.

6. Using the tool shown in Fig. 24, remove the U-joint flange.

7. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in

a rotational motion, then wipe clean. Apply a small amount of lubricant to U-joint splines.

8. Install the U-joint flange using the tool shown in Fig. 45.

9. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

10. Hold the flange with the tool shown in Fig. 21, 22 or Fig. 23 while the nut is being tightened.

11. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

12. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 8 to 14 in-lb over the original reading is reached. (The preload should not exceed 8 to 14 in-lb over the original reading, or bearing failure may result.

Under no circumstances should the pinion nut be backed off to lessen preload. If this is done, a new pinion bearing spacer must be installed. In addition, the U-joint flange must never be hammered on, or power tools used.

13. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

14. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange.

15. Check the lubricant level. Make sure the axle is in running position.

Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

SOLID SPACER

1. Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups

so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

2. While holding the flange with the tool shown in Fig. 22 or Fig. 23, remove the integral pinion nut and washer.

3. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear.

4. Using the tool shown in Fig. 24, remove the U-joint flange.

5. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in a rotational motion, then wipe clean. Apply a small amount of lubricant to U-joint splines.

6. Install the U-joint flange using the tool shown in Fig. 45.

7. Install integral attaching nut and washer on the pinion shaft.

8. Tighten the pinion attaching nut, rotating the pinion several times to seat the bearing, then torque the pinion attaching nut to 180-220 ft-lbs. Hold the flange with the tool shown in Fig. 22 or 23 while the nut is being tightened.

9. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

10. Connect the rear end of the drive shaft to the axle U-joint flange.

11. Check the lubricant level, and add whatever amount of specified lubricant is necessary to reach the lower edge of the filler plug hole. Make sure the axle is in running position when the level is checked.

DRIVE SHAFT PINION ANGLE ADJUSTMENT

Refer to Group 14, Part 14-3 for this procedure.

3 REMOVAL AND INSTALLATION

CARRIER ASSEMBLY

REMOVAL

1. Raise the vehicle on a hoist and remove the two rear wheels and tires.

2. Remove the two brake drums (3 Tinnerman nuts at each drum) from the axle shaft flange studs. If difficulty is experienced in removing the drums, remove the brake adjuster knockout slug or rubber plug (if so equipped) and back off the brake shoes.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the rear wheel bearing retainer plate. Pull each axle shaft assembly out of the axle housing using axle shaft remover, T66L-4234-A (Fig. 4). **Care must be exercised to prevent damage to the oil seal. Any roughing or cutting of the seal element during removal or installation can result in early seal failure.** Install a nut on one of the brake backing plate attaching bolts to hold the plate to the axle housing after the shaft has been removed. **Whenever a rear axle shaft is replaced, the wheel bearing oil seals must be replaced.** Remove the seals with tool 1175AB.

4. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position at assembly. Disconnect the drive shaft at the rear axle U-joint. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position relative to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

5. Clean area around carrier to housing surfaces with a wire brush and wipe clean, to prevent dirt entry into the housing. Place a drain pan under the carrier and housing, remove the carrier attaching nuts, and drain the axle. Remove the carrier assembly from the axle housing.

INSTALLATION

Synthetic-type wheel bearing seals must not be cleaned, soaked or washed in cleaning solvent.

1. Clean the axle housing and shafts using kerosene and swabs. To avoid contamination of the grease in the sealed ball bearings, do not allow any quantity of solvent directly on the wheel bearings. Clean the mating surfaces of the axle housing and carrier.

2. Position the differential carrier on the studs in the axle housing using a new gasket between carrier and housing. Install the carrier-to-housing attaching nuts, and torque them to specifications.

3. Remove the oil seal replacer tool from the transmission extension housing. Position the drive shaft so that the front U-joint slip yoke splines to the transmission output shaft.

4. Connect the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange during the removal procedure. Install the U-bolts and nuts and torque to specifications.

5. Wipe a small amount of an oil resistant sealer on the outer edge of each seal before it is installed. **Do not put any of the sealer on the sealing lip.** Install the oil seals in the ends of the rear axle housing with one of the tools shown in Fig. 12. (Use the proper tool so that pressure is applied only to the outer edge of the seal).

6. Install the two axle shaft assemblies in the axle housing. Care must be exercised to prevent damage to the oil seals. The shorter shaft goes into the left side of the housing.

Carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the differential side gear, and push the shaft in until the bearing bottoms in the housing.

7. Install the bearing retainers on the attaching bolts on the axle housing flanges. Install the nuts on the bolts and torque to specifications.

8. If the rear brake shoes were backed off, adjust the brakes as outlined in Part 12-1 and install rubber plugs in the adjuster slots.

9. Install the two rear brake drums and the drum Tinnerman nuts.

10. Install the rear wheels and tires.

11. Fill the rear axle with specified lubricant.

AXLE HOUSING (COIL SPRING SUSPENSION)

REMOVAL

1. Remove the carrier assembly from the axle housing as outlined in Differential Carrier Removal and Installation.

2. Position safety stands under the frame rear members, and support the axle housing with either a floor jack or hoist.

3. Disengage the brake line from the clips that retain the line to the axle housing.

4. Disconnect the vent tube from the rear axle housing.

5. Remove the brake backing plate assemblies from the axle housing, and support them with wire. **Do not disconnect the brake line.**

6. Disconnect the lower studs of the two rear shock absorbers from the mounting brackets on the axle housing (Fig. 13).

7. Remove the attaching nut and washer, and disconnect the track bar from the mounting stud on the axle housing bracket.

8. Lower the axle housing until the coil springs are released. Lift out the coil springs and insulators.

9. Remove the nuts, washers and pivot bolts that connect the suspension lower arms to the axle housing. Disconnect both arms from the axle housing.

10. Disconnect the upper suspension arm from the axle housing by removing the pivot bolt, nut, lock washer and the two eccentric washers (Fig. 13).

11. Lower the axle housing and remove it from under the vehicle.

INSTALLATION

1. Transfer the track bar mounting stud from the old to the new housing. If the axle housing is new, install a new vent. The hose attaching portion must face toward the front of the vehicle.

2. Wipe a small amount of an oil resistant sealer on the outer edge of each seal before it is installed. **Do not put any of the sealer on the sealing lip.** Install the oil seals in the ends of the axle housing with one of the tools shown in Fig. 12.

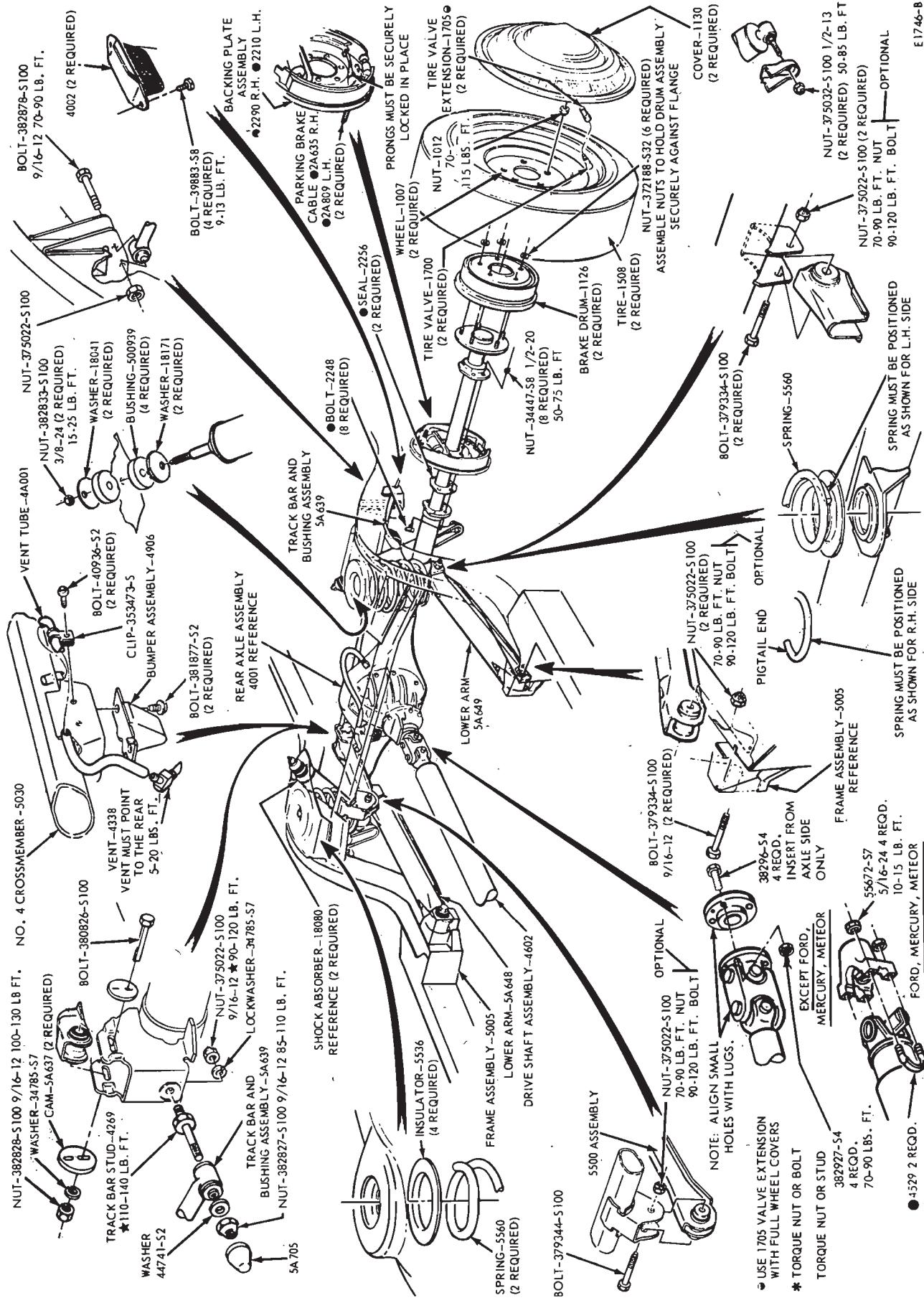


FIG. 13—Rear Axle Installation—Coil Spring Suspension

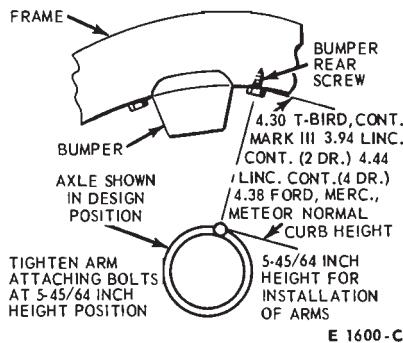


FIG. 14—Axe Normal Curb Height and Controlled Height for Arm Installation

3. Position the replacement axle housing under the vehicle, and raise the axle with a hoist or floor jack. Connect the suspension lower arms to their mounting brackets on the axle housing with pivot bolts and nuts. **Do not tighten the bolts and nuts at this point.**

4. Position the suspension upper arm in its mounting bracket on the axle housing, and install the adjusting bolt, eccentric washers, lock washer and nut. **Leave the bolt and nut loose at this point.**

5. Position the brake lines to the axle housing, and secure with the retaining clips.

6. Install the brake backing plates on the axle housing flanges.

7. Connect the track bar to the mounting stud, install the washer and attaching nut, and torque to specifications.

8. Position the rear coil springs and insulators in the pockets provided.

9. Connect the lower studs of the two rear shock absorbers to the mounting brackets on the axle housing. Install the attaching nuts, and torque to specifications.

10. Connect the vent tube to the vent on the housing. **If axle housing is new, install a new vent.**

11. Clean the mating surfaces of the axle housing and differential carrier. Position the carrier on the mounting studs on the housing using a new gasket between carrier and housing. Install the copper washers and the carrier-to-housing attaching nuts, and torque to specifications.

12. Make sure that both the front and rear pivot bolts of the upper and the two lower arms are loose, and then raise the axle assembly to controlled curb height (Fig. 14). Hold the axle at controlled curb height by placing blocks or pieces of steel pipe

between the axle housing and the bumper rear screw on the side rail.

13. With the axle at controlled curb height, torque the suspension upper and lower arm front pivot bolts and nuts to specifications. Torque the lower arm-to-axle housing pivot bolts and nuts to specifications.

14. Remove the oil seal replacer tool from the transmission extension housing. Position the drive shaft so that the front U-joint slip yoke splines to the transmission output shaft.

15. Connect the drive shaft to the U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange during the removal procedure. Install the U-bolts and nuts and torque to specifications.

16. Carefully slide the two axle shaft assemblies in the axle housing. The shorter shaft goes into the left side of the housing. Use care in sliding the axle shafts into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the differential side gear, and push the shaft in until the rear wheel bearing bottoms in the housing.

17. Install the rear wheel bearing retainers on the attaching bolts on the axle housing flanges. Install the nuts on the bolts and torque to specifications.

18. If the rear brake shoes were backed off, adjust the brakes as outlined in Part 12-1, and install rubber plugs in the adjuster slots.

19. Install the two rear brake drums and the drum attaching (Tinnerman) nuts.

20. Install the rear wheels and tires.

21. Fill the rear axle to the bottom of the filler plug hole located in either the carrier casting or housing cover with specified lubricant. Be sure that the axle is in operating position.

22. Road test the vehicle to be sure that pinion and driveshaft angles are correct. Any shudder during heavy acceleration, or deceleration may require a pinion and driveshaft angle re-adjustment as detailed in **Driveshaft and Pinion Angle Adjustment, Group 14.**

AXLE HOUSING (LEAF SPRING SUSPENSION)

REMOVAL

1. Raise the vehicle and support it with safety stands under the rear

frame member.

2. Drain the lubricant from the axle.

3. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly. Disconnect the drive shaft at the drive pinion flange.

4. Disconnect the lower end of the shock absorbers.

5. Remove the wheels, brake drums and both axle shafts as outlined in Section 2.

6. Remove vent hose front vent tube (Corbin clamp) and remove vent tube from brake tube junction and axle housing.

7. Remove the hydraulic brake T-fitting from the axle housing. **Do not open the hydraulic brake system lines.** Remove the hydraulic brake line from its retaining clip on the axle housing.

8. Remove both axle shaft oil seals with the tool shown in Fig. 9.

9. Remove both brake backing plates from the axle housing and suspend them above the housing with mechanic's wire. The hydraulic brake lines and the parking brake cables are still attached to the brake backing plates.

10. Support the rear axle housing on a jack, and then remove the spring clip nuts. Remove the spring clip plates (Fig. 15).

11. Lower the axle housing and remove it from under the vehicle.

12. If the axle housing is being replaced, transfer all the differential and pinion parts to the new housing. See Section 4, Major Repair Operations.

INSTALLATION

1. Raise the axle housing into position so that the spring clip plates can be installed. On a Montego or Fairlane, position the spring upper insulators and retainers between the axle housing and springs and install the lower insulators. Torque the spring clip nuts to specification.

2. Place the brake backing plates in their normal position on the axle housing.

3. Install new axle shaft oil seals with the tool shown in Fig. 12. **Installation without use of the proper tool will distort the seal and cause leakage.** Coat the outside edges of the new oil seal with a non-hardening type of sealer such as Permatex No. 2 or its equivalent.

4. Install the axle shafts, brake drums and wheels as outlined in Sec-

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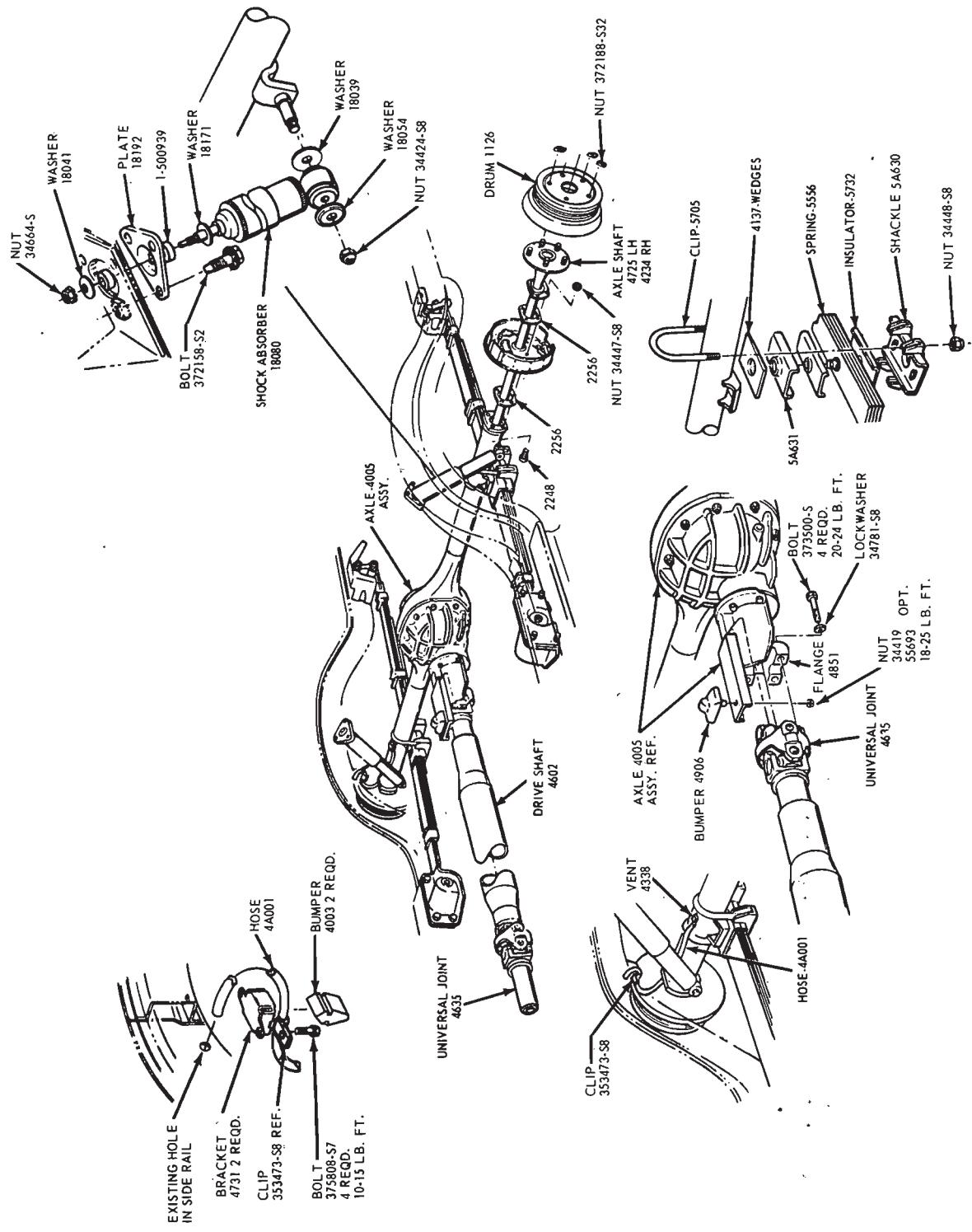


FIG. 15—Rear Axle Installation—Typical Leaf Spring Suspension

tion 2.

5. Attach the hydraulic brake line T fitting to the axle housing, and secure the hydraulic brake line in its retainer on the axle housing.

6. Install vent tube to brake tube

junction and install vent hose to vent tube.

7. Raise the axle housing and connect the shock absorbers.

8. Connect the rear end of the drive shaft to the axle U-joint flange,

aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange.

9. Fill the axle with the proper grade and amount of lubricant.

10. Road test the vehicle.

4 MAJOR REPAIR OPERATIONS

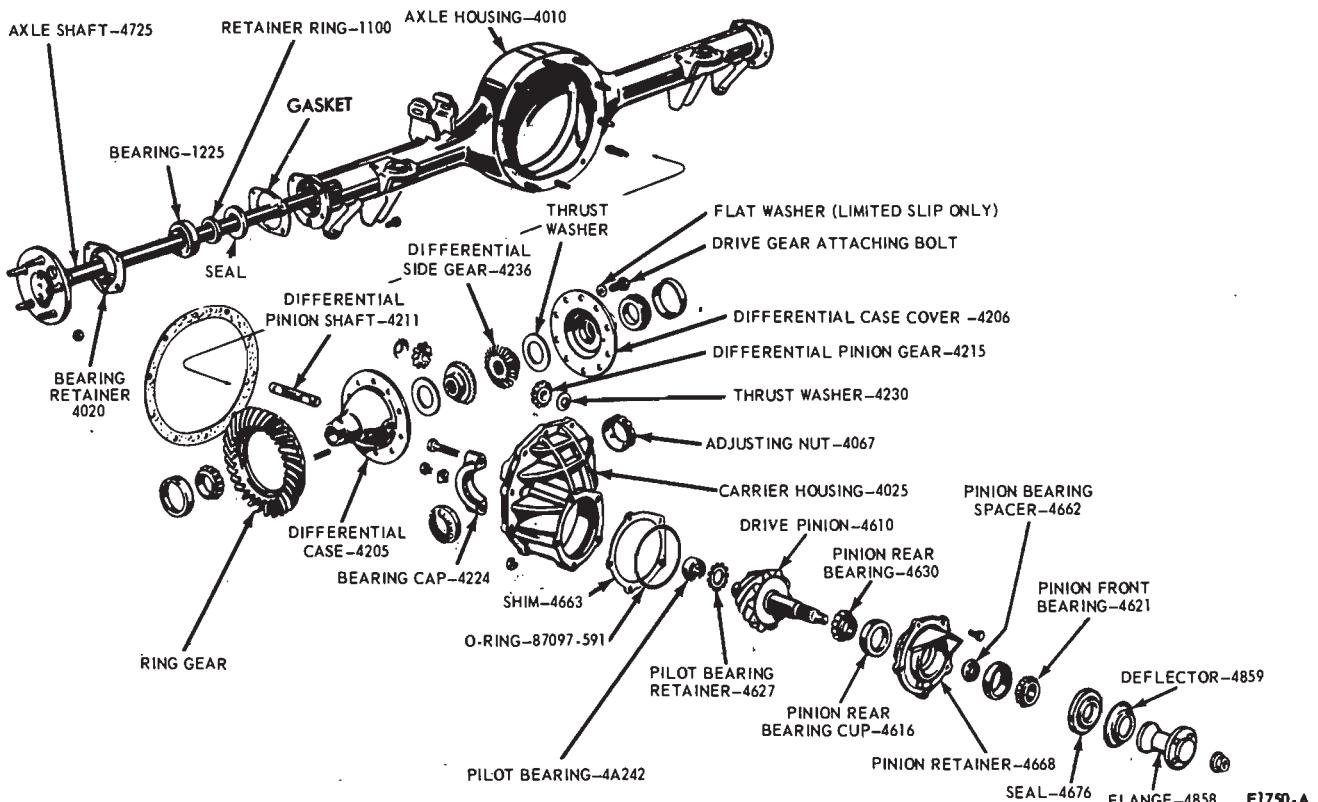


FIG. 16—Rear Axle Disassembled—Typical Removable Carrier With Conventional Differential

DIFFERENTIAL CARRIER DISASSEMBLY

CONVENTIONAL DIFFERENTIAL

A disassembled view of the rear axle assembly is shown in Fig. 16.

After mounting the carrier in a holding fixture, disassemble the carrier as outlined in the following procedures:

1. Mark one differential bearing cap and the mating bearing support with punch marks to help position the parts properly during assembly of the carrier. Also, mark one of the bearing adjusting nuts and the carrier with scribe marks for proper location during assembly.

2. Remove the adjusting nut locks, bearing caps, and adjusting nuts. Then lift the differential case assembly out of the carrier.

(Remove the bearing caps by tapping the caps lightly with a soft mallet.)

3. Remove the differential bearings with the tools shown in Fig. 17.

4. Mark the differential case, cover, and ring gear for assembly in the original position.

5. Remove the bolts that attach the ring gear to the differential case. Press the gear from the case or tap it off with a soft-faced hammer.

6. With a drift, drive out the differential pinion shaft lock pin (Fig. 18), and separate the 2-piece differential case.

7. Drive out the pinion shaft with a brass drift (Fig. 19).

8. Remove the gears and thrust washers (Fig. 47).

TRACTION-LOK DIFFERENTIAL

1. Remove the differential case from the carrier and remove the bearings from the differential case in the same manner as the conventional differential case.

2. Remove ten bolts and washers securing the ring gear to the differential case assembly. The ring gear must be removed in order to separate the case halves.

3. Remove the ring gear by tapping the gear with a soft hammer or press

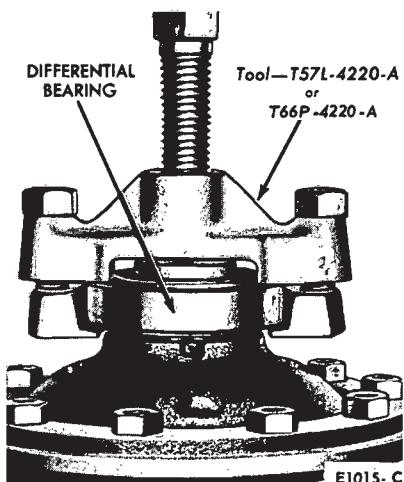


FIG. 17—Removing Differential Bearing

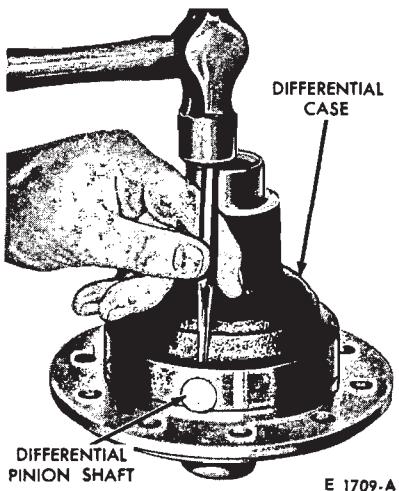


FIG. 18—Removing Differential Pinion Shaft Lock Pin

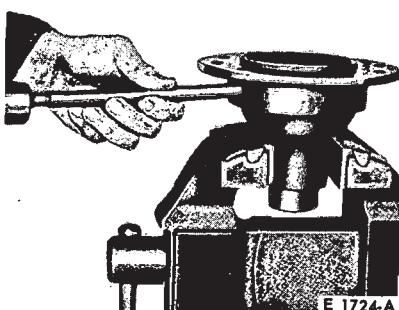


FIG. 19—Driving Out Differential Pinion Shaft

the gear from the case.

4. Place the differential case in a press to load the bearing journals so that the pre-load of the springs is overcome (approx. 1,500 lbs.). (If a press is not available, two 7/16 inch

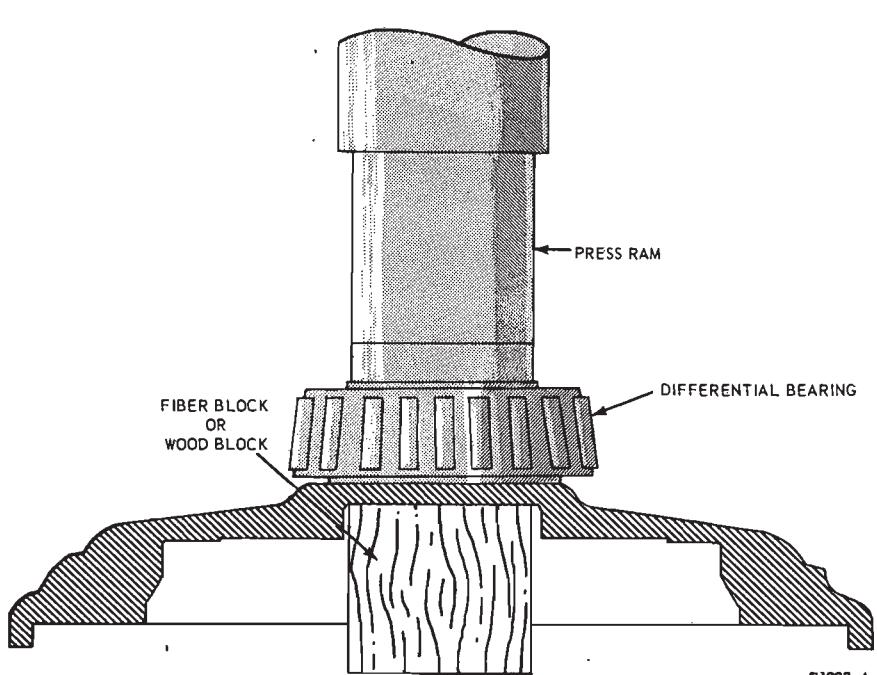


FIG. 20—Installing Differential Bearing—Traction-Lok

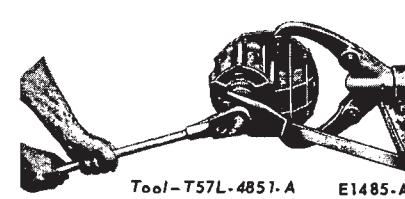


FIG. 21—Removing Pinion Shaft Nut

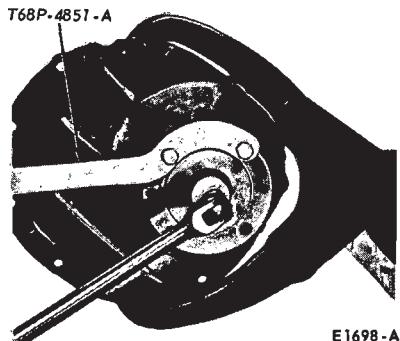


FIG. 23—Companion Flange Holding Tool

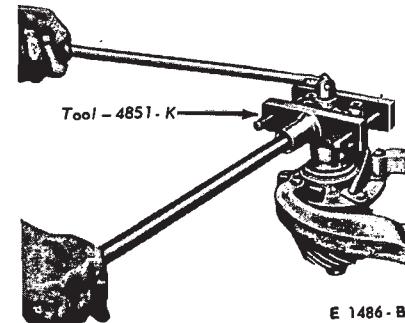


FIG. 22—U-Joint Flange Holding Tool

bolts and nuts can be used in the ring gear mounting holes (one on each side) to compress the case halves together and overcome pre-load spring tension.) Then, while the case is still under pressure, loosen the two Allen or Phillips head screws which hold the case halves together until one or two threads of the screws remain engaged. Remove the case assembly from the press. Tap on the cover to

spring it loose; then, remove both screws.

5. With the cover facing down, lift off the case. Remove the pre-load spring plate and four pre-load springs.

6. From the cover remove the side gear, four clutch plate ear guides, clutch hub, friction and steel clutch plates and shim(s).

7. With a suitable drift, drive out the pinion shaft lock pins from the case.

8. With a brass drift, drive out the long pinion shaft from the case. Drive from the end opposite the lock pin hole.

9. Remove the two short pinion shafts (four-pinion differential only), using a drift, driving each shaft from the center outward.

10. Lift out the center block, then remove the pinion gears, thrust wash-

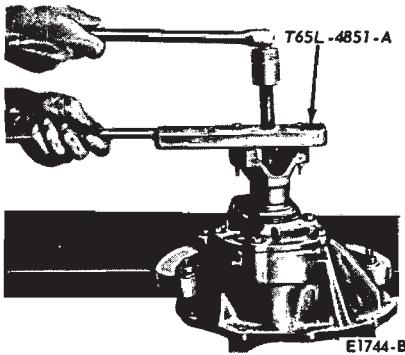


FIG. 24—Removing U-Joint Flange

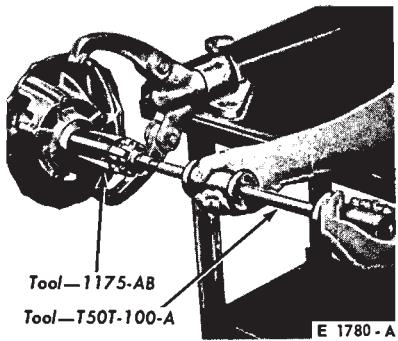


FIG. 25—Removing Pinion Seal

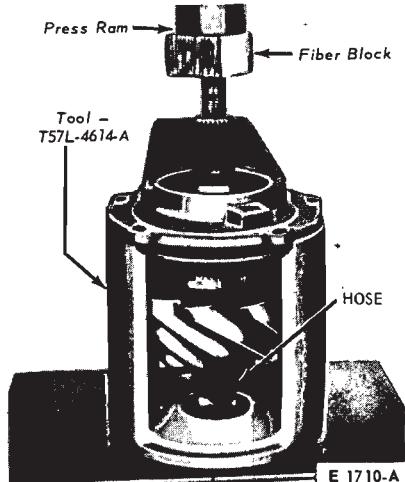


FIG. 26—Removing Pinion Front Bearing

ers and side gear and thrust washer.
11. If the differential bearings are removed, the bearings can be installed in one of the following ways:
a. With the differential case and cover completely assembled.
b. On the case or cover when disassembled. However, when pressing the bearings on the cover, a block of wood or fiber must be used as shown in Fig. 20 in order to avoid damage to the cover:

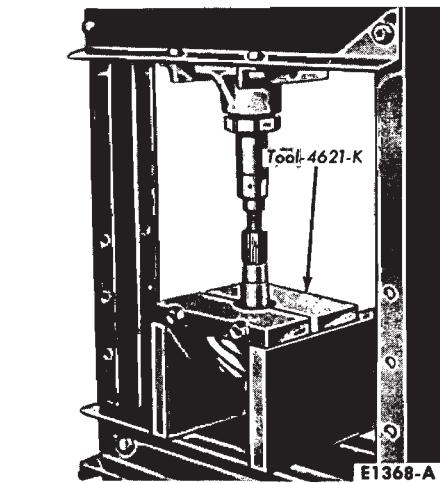


FIG. 27—Removing Pinion Rear Bearing Cone

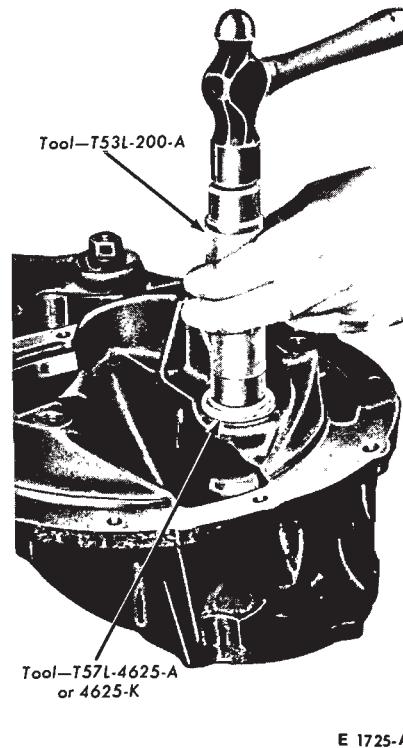


FIG. 28—Removing Pilot Bearing

REMOVAL AND DISASSEMBLY OF DRIVE PINION AND BEARING RETAINER

1. Turn the carrier assembly upright and remove the pinion shaft nut (Fig. 21 and 22).
2. Remove the U-joint flange from the pinion shaft (Fig. 24).
3. Remove the pinion seal (Fig. 25).

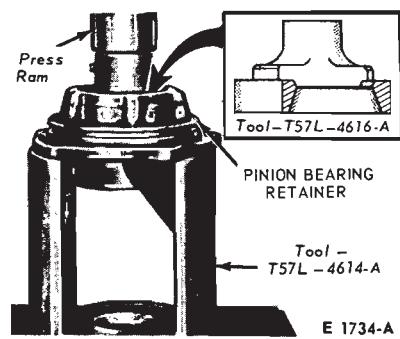


FIG. 29—Removing Pinion Front Bearing Cup

4. Remove the pinion, bearing, and retainer assembly from the carrier housing (Fig. 41). Measure the shim thickness with a micrometer. Record this original shim thickness. If a new gear set is installed during assembly, a new shim will have to be installed. The original shim thickness is one of the factors necessary in determining the new shim thickness. Extreme care must be taken not to damage the mounting surfaces of the retainer and carrier.

5. Place a protective sleeve (hose) on the pinion pilot bearing surface. Press the pinion shaft out of the pinion front bearing cone with the tool shown in Fig. 26.

6. Press the pinion shaft out of the pinion rear bearing cone and roller (Fig. 27).

PILOT BEARING

1. Remove the pilot bearing as shown in Fig. 28. Drive out the pilot bearing and the bearing retainer together.

PINION BEARING CUPS

Do not remove the pinion bearing cups from the retainer unless the cups are worn or damaged. The flange and pilot of the retainer are machined during manufacture by locating on these cups after they are installed in their bores. If the cups are worn or damaged, they should be replaced.

Remove the bearing cups as shown in Figs. 29, 30 and 31. Install the cups as shown in Figs. 32 and 33.

After the new cups are installed, make sure they are seated in the retainer by trying to insert a 0.0015-inch feeler gauge between the cup and the bottom of the bore.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

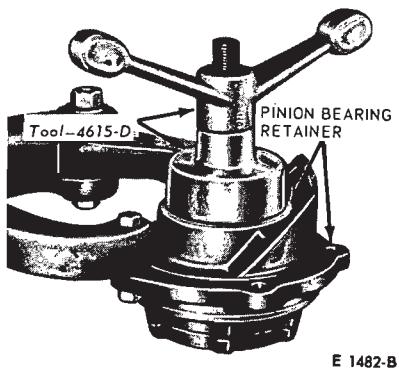


FIG. 30—Removing Pinion Front Bearing Cup

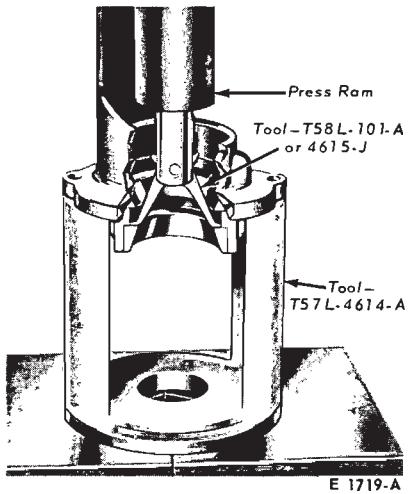


FIG. 31—Removing Pinion Rear Bearing Cup

DRIVE PINION AND RING GEAR SET

When replacing a ring gear and pinion, note that the original factory installed shim is of the correct thickness to adjust for individual variations in both the carrier housing dimension and in the original gear set dimension. Therefore, to select the correct shim thickness for the new gear set to be installed, follow these steps:

1. Use a micrometer to measure the thickness of the original shim removed from the axle and use the same thickness upon installation of the replacement carrier assembly or drive pinion. If further shim change is necessary, it will be indicated in the tooth pattern check.

2. If the original shim is lost, substitute a nominal shim for the original and use the tooth pattern check to determine if further shim changes are required. Nominal shim thicknesses are indicated in Specifications.

A new ring gear and pinion should

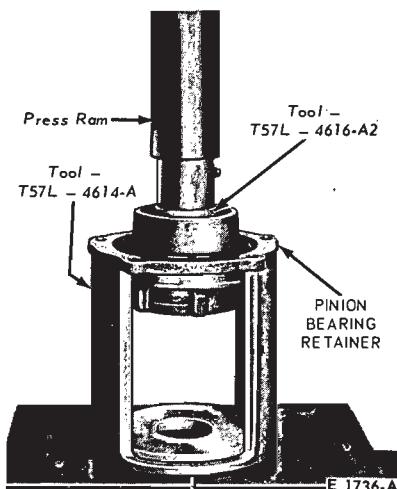


FIG. 32—Installing Pinion Front Bearing Cup

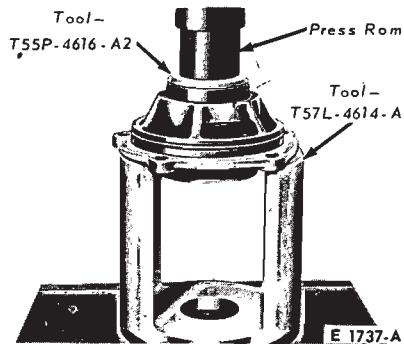


FIG. 33—Installing Pinion Rear Bearing Cup

always be installed in an axle as a matched set (never separately). Be sure the same identifying (matching) number, appears on the bolt hole face of the ring gear and on the head of the drive pinion (Fig. 34).

3. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE BEARINGS AND RING GEAR TEST

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

1. Assemble the two halves of the differential case together without the ring gear, and press the two differential side bearings on the hubs.

2. Place the cups on the bearings

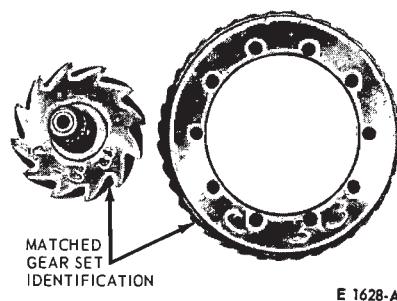


FIG. 34—Pinion and Ring Gear Markings

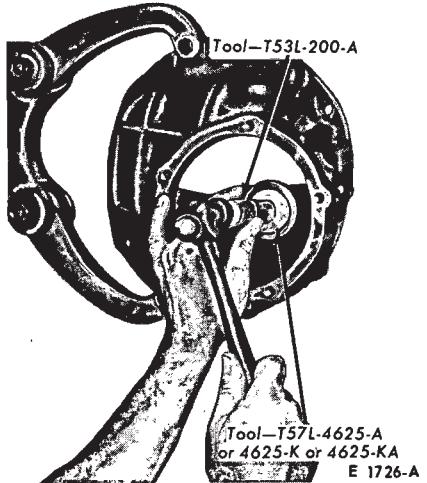


FIG. 35—Installing Pilot Bearing

and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in Steps 11 thru 14 under Assembly and Installation of Conventional Differential Case which follows in this section.

4. Tighten the right nut two notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. This step is important.

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 14, Part 15-1, adjust the preload to 0.008 to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if re-used.

6. Check the runout of the differential case flange with a dial indicator. If the runout does not now exceed specifications, install a new ring gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a damaged

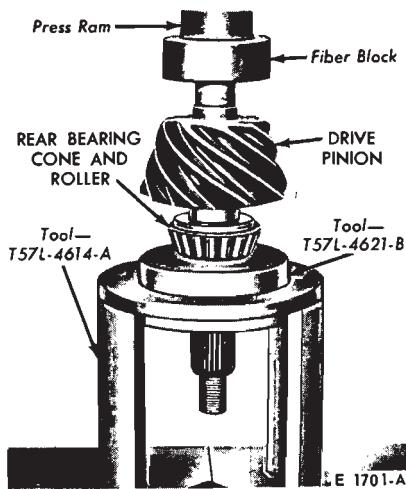


FIG. 36—Installing Pinion Rear Bearing Cone

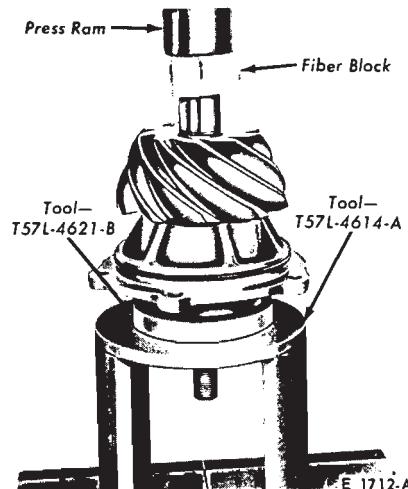
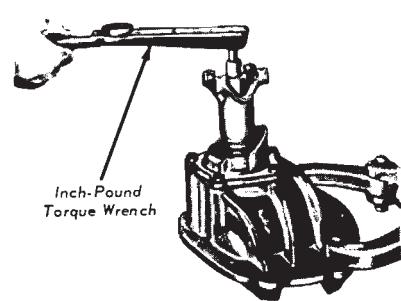


FIG. 39—Installing Pinion Front Bearing



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FIG. 41—Checking Pinion Bearing Preload

DIFFERENTIAL CARRIER ASSEMBLY

PILOT BEARING INSTALLATION

1. Drive the new pilot bearing inward until it bottoms, as shown in Fig. 35.
2. Using the same tool indicated in Fig. 35, install the new pilot bearing retainer with the concave side up.

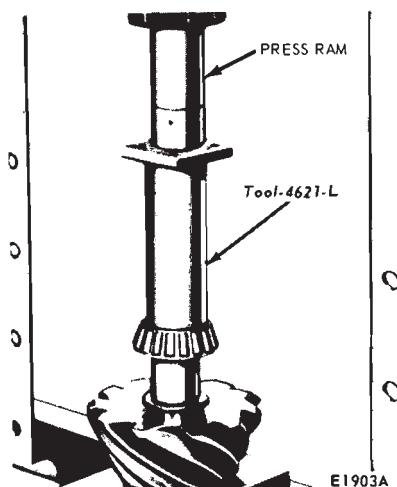


FIG. 37—Installing Pinion Rear Bearing Cone

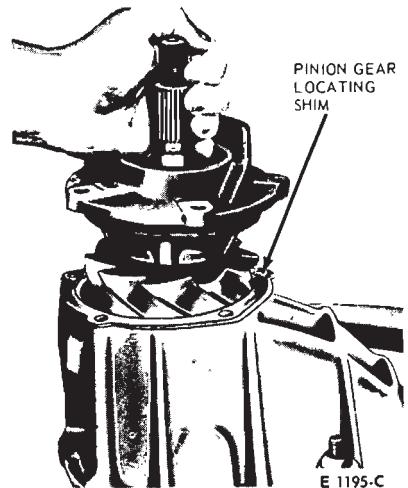


FIG. 40—Removing or Installing Pinion and Retainer Assembly

case or worn bearings.

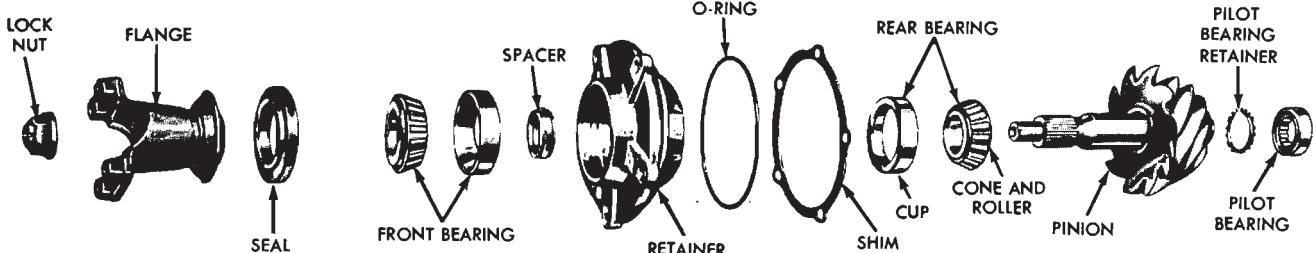
7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install new bearings on the case hubs, and again install the differential assembly in the carrier without the ring gear.

9. Check the case runout again with the new bearings. If the runout is now within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is damaged and should be replaced.

COLLAPSIBLE PINION BEARING SPACER INSTALLATION

1. Install the drive pinion rear bearing cone and roller on the pinion shaft (Figs. 36 or 37). Place a new spacer on the pinion shaft (Fig. 38).
2. Place the bearing retainer on the pinion shaft, and install the front bearing cone and roller. Press the front bearing cone and roller into position as shown in Fig. 39. Be careful not to crush the bearing spacer.
3. Lubricate the O-ring with axle lubricant and install it in its groove in the pinion retainer. Be careful not to twist it. Snap the O-ring into position.
4. Place the proper shim on the carrier housing and install the pinion



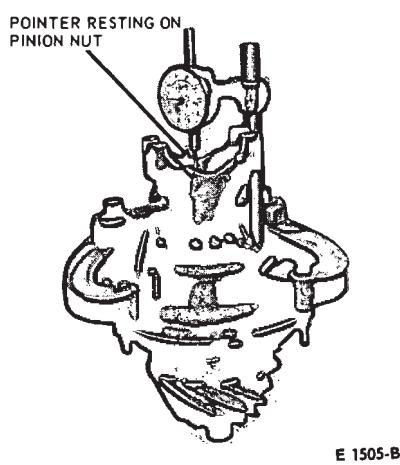
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FIG. 38—Pinion and Bearing Retainer

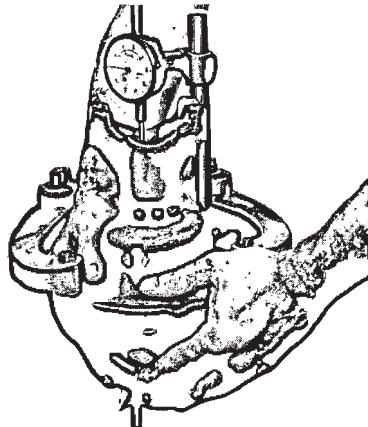
AS END PLAY READS (10/1000 inch) USE THIS SPACER	.0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	0.481	0.480	0.479	0.478	0.478	0.476	0.474	0.474	0.472	0.472	0.470	0.470	0.468	0.468	0.466	0.465
If there is no end play and preload exists:																
IF PRELOAD READS(in-lbs.) USE THIS SPACER	2-11	12-20	21-30	31-45												
	0.482	0.483	0.484	0.485												

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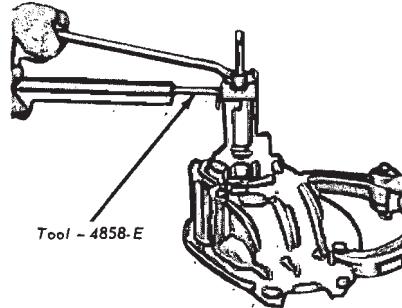
FIG. 42—Solid Spacer Selection



E 1505-B



E 1506-B



E 1197-D

FIG. 43—End Play Indicator Installation

and retainer assembly, being careful not to pinch the O-ring (Fig. 40).

5. Install the pinion attaching bolts. Torque the bolts to specification.

6. Place the slinger over the pinion shaft and against the front bearing.

7. Install a new seal in the bearing retainer (Fig. 46).

8. Install the U-joint flange (Fig. 48).

9. Start a new integral nut and washer on the pinion shaft.

10. Hold the flange with the tool shown in Fig. 21 or Fig. 22, and torque the pinion shaft nut to 175 ft-lbs. **Do not exceed 175 ft-lbs at this time.**

11. Check the pinion bearing preload as shown in Fig. 41. Correct pre-load will be obtained when the torque required to rotate the pinion in the retainer is as specified in Part 15-7. If the torque required to rotate the pinion is less than specified, tighten the pinion shaft nut a little at a time until the proper pre-load is established. **Do not overtighten the nut.** If excessive pre-load is obtained as a result of overtightening, replace the collapsible bearing spacer.

Do not back off the pinion shaft

FIG. 44—Checking Pinion End Play

nut to establish pinion bearing pre-load. If the torque on the pinion shaft nut is less than 175 ft-lbs after bearing pre-load is established, a new collapsible spacer must be used.

SOLID PINION BEARING SPACER INSTALLATION

The spacer is serviced in 20 sizes listed in Specifications. The manner of selecting the size spacer required for obtaining correct pre-load is included in the following assembly procedure.

1. Install the drive pinion rear bearing cone and roller assembly on the pinion shaft as shown in Figs. 37 and 38.

2. Select a new solid spacer of a larger size (0.485 inch thick), and slide it over the pinion shaft against the rear bearing.

The pinion bearing pre-load can be accurately measured only when the pinion shaft nut is torqued to 180-220 ft-lbs. If a spacer smaller than required was used, the specified 180-220 ft-lbs torque would damage the bearings. For this reason, the largest spacer should be tried first. Then, if the

FIG. 45—Installing U-Joint Flange

bearings are too loose, the size of the spacer can be decreased until the correct pre-load is obtained.

3. Position the bearing retainer and cup assembly on the pinion shaft and install the front bearing cone and roller. Press the front bearing cone and roller assembly into position, as shown in Fig. 37.

4. Mount the retainer in a holding fixture as shown in Fig. 22, and place the slinger over the pinion shaft and against the front bearing.

5. Install the U-joint flange with the tool shown in Fig. 45.

6. Hold the flange with the tool shown in Fig. 22 or 23, and install the old pinion shaft nut. Using a ft-lb torque wrench, torque the nut to 180-220 ft-lbs. While tightening the nut, rotate the bearing retainer to determine the existence of any bearing pre-load which will be indicated by a slight drag in the rotation of the retainer.

DETERMINING SPACER SIZE FROM PRELOAD READING

1. If bearing drag indicates a pre-load condition exists, apply an in-lb

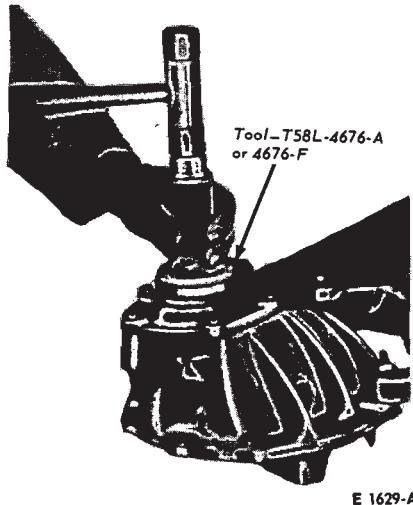


FIG. 46—Installing Oil Seal

torque wrench to the pinion nut as shown in Fig. 41 and read the torque required to turn the shaft. Effort should be 12-1/2 to 32-1/2 in-lbs.

2. If preload is the correct value proceed with assembly procedure given in Final Assembly of Pinion and Retainer, which follows.

3. If preload exists, but is below specification, select the correct spacer from Fig. 42 and install, completing assembly as shown in Final Assembly of Pinion and Retainer.

DETERMINING SPACER SIZE FROM END PLAY READING

1. If no perceptible preload is felt when rotating the pinion shaft, install a dial indicator as shown in Fig. 43, so that the indicator point is resting on the end of the pinion gear shaft (companion flange end).

2. Use both hands to squeeze the pinion shaft and the bearing retainer together (Fig. 44). Record the end play reading shown on the dial indicator.

3. Disassemble the pinion shaft and retainer and install the correct spacer as shown in Fig. 42.

4. Proceed with assembly of the pinion shaft and retainer as directed in Final Assembly of Pinion and Retainer.

FINAL ASSEMBLY OF PINION AND RETAINER

1. Install the drive pinion rear bearing cone and roller assembly on the pinion shaft as shown in Figs. 36 and 37.

2. Slide the correct spacer over the pinion shaft against the rear bearing.

3. Position the bearing retainer and cup assembly on the pinion shaft and install the front bearing cone and roll-

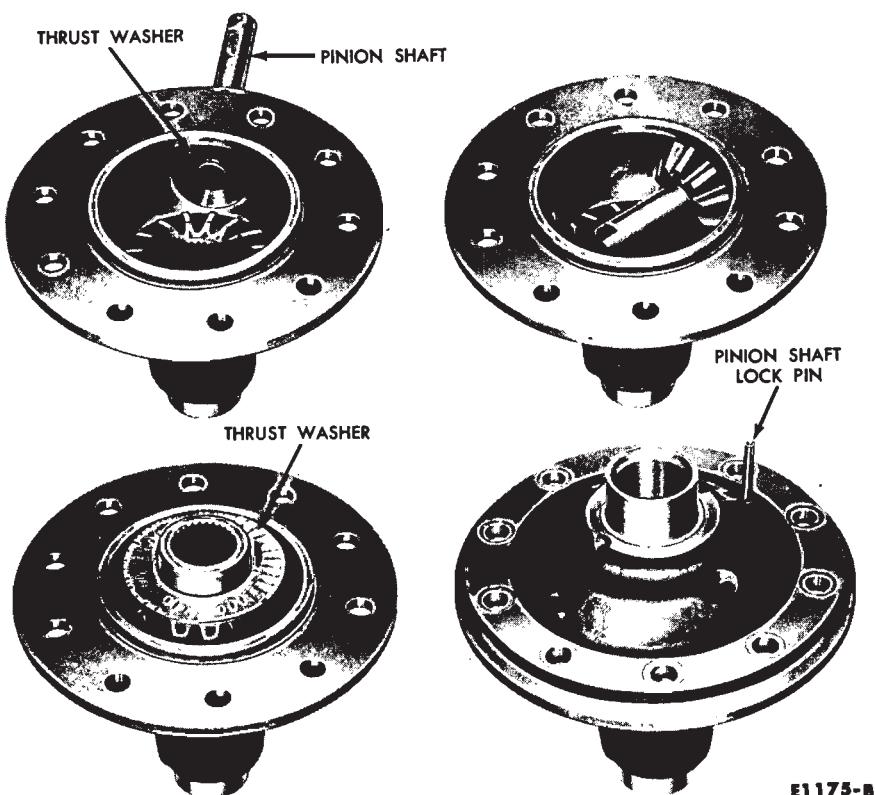


FIG. 47—Assembling Differential Case

er. Press the front cone and roller into position, as shown in Fig. 45.

4. Lubricate a new O-ring with axle lubricant and install it in the groove provided in the pinion retainer. Be careful not to twist the O-ring. Install it by snapping it into place.

5. Place the proper shim on the carrier housing and install the pinion and retainer assembly, being careful not to pinch the O-ring (Fig. 40).

6. Install the pinion retainer bolts. Torque the bolts to specification.

7. Place the slinger over the pinion shaft and against the front bearing.

8. Install a seal in the bearing retainer, (Fig. 46).

9. Start a new integral nut and washer on the pinion shaft.

10. Hold the companion flange with the tool shown in Fig. 21 or 22 and torque the pinion nut to specifications (200 ft-lbs).

11. With a new seal installed, pinion bearing preload should now read 17 to 32 in-lbs for new pinion bearings and new seal, or 8 to 14 in-lbs for original bearings and a new seal.

ASSEMBLY AND INSTALLATION OF DIFFERENTIAL CASE

Conventional Differential Case

- Place a side gear and thrust

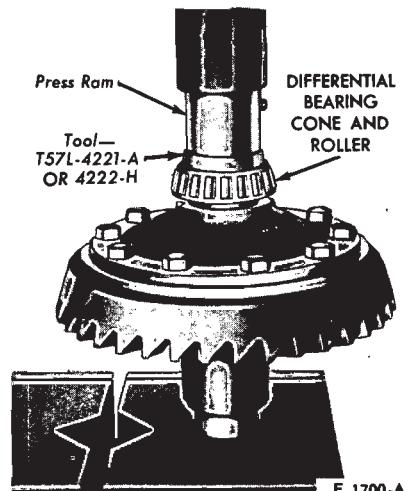


FIG. 48—Installing Differential Bearing

washer in the differential case bore (Fig. 47). Lubricate all differential parts liberally with axle lubricant during assembly.

2. With a soft-faced hammer, drive the differential pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. Carefully line up the pinion shaft lock pin holes.

4. Place the second side gear and

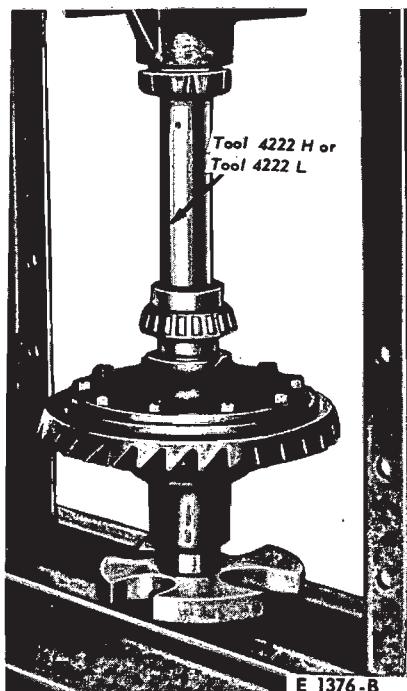


FIG. 49—Installing Differential Bearing

thrust washer in position (Fig. 47), and install the cover on the differential case. Install the pinion shaft lock pin. A pinion or axle shaft spline can be inserted in the side gear spline to check for free rotation of the differential gears.

5. Insert two 7/16 (N.F.) bolts two inches long through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the ring gear into position.

6. Install and tighten the ring gear bolts and washers evenly, and torque them alternately across the gear to specification.

7. If the differential bearings have been removed, press them on as shown in Figs. 48 and 49.

8. Wipe a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

9. Place the cups on the bearings. If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 50.

In almost every case of improper assembly (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

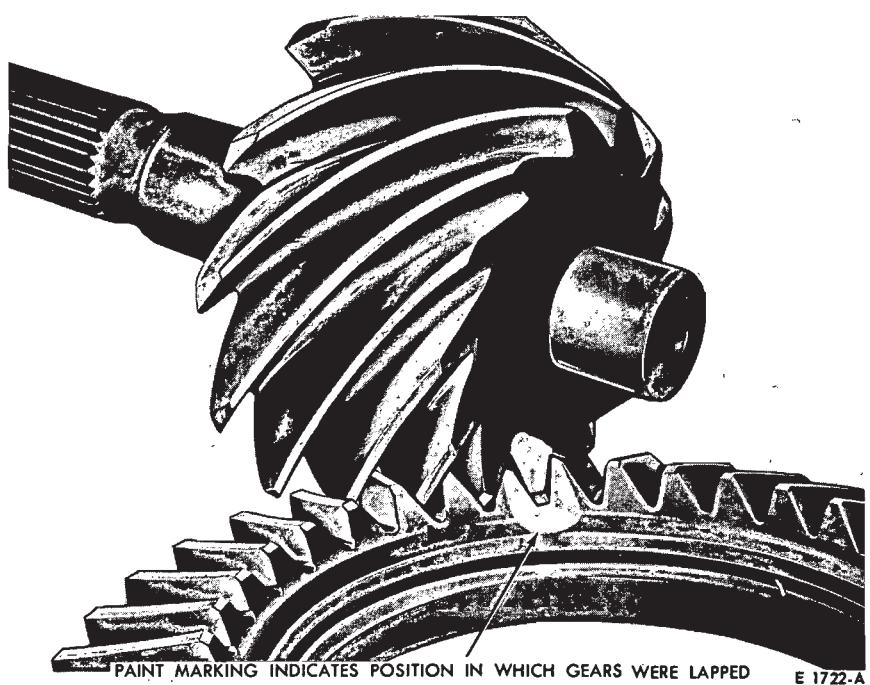


FIG. 50—Gear Set Timing Marks

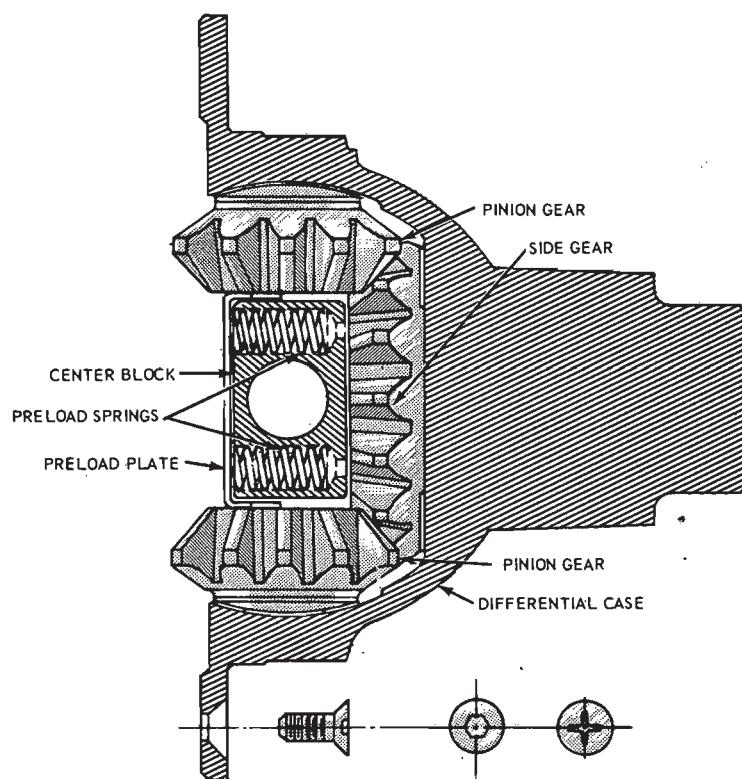
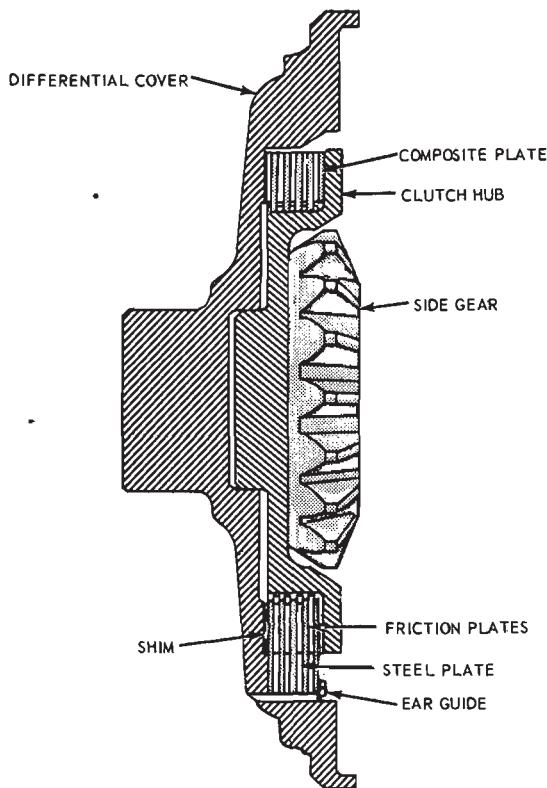


FIG. 51—Center Block and Pre-Load Springs Installation—Traction-Lok Differential

When installing the **hunting** type gear set (no timing marks), assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

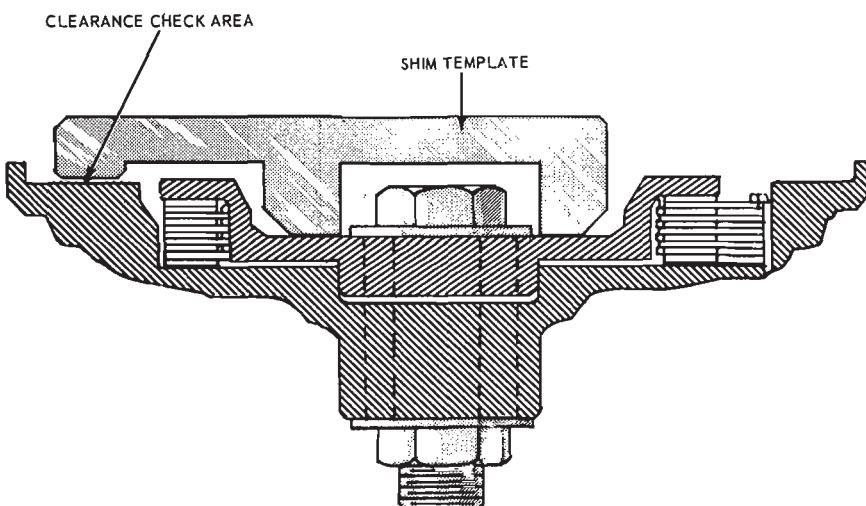
10. Slide the assembly along the bores until a slight amount of backlash is felt between the gear teeth.

11. Set the adjusting nuts in the bores so that they just contact the bearing cups. The nuts should be



E1894-A

FIG. 52—Clutch Pack Installation



E1895-A

FIG. 53—Shim Template Tool Application

engaged about the same number of threads on each side.

12. Carefully position the bearing caps on the carrier. Match the marks made when the caps were removed.

13. Install the bearing cap bolts and alternately torque them to speci-

fication.

14. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged threads or incorrectly positioned caps. Tightening the bolts to the specified torque

is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 25 ft-lbs before making adjustments.

15. Adjust the backlash between the ring gear and pinion as outlined in Part 15-1, Section 2.

16. Be sure to make a final tooth pattern check before installing the carrier assembly in the axle housing.

ASSEMBLY OF TRACTION-LOK DIFFERENTIAL CASE

1. Lubricate all parts with Ford Hypoid Lubricant (Ford Part No. C9AZ-19580-A, during assembly of differential.

2. Mount the differential case in a soft jawed vise and place a side gear thrust washer and side gear in the counterbore of the case.

3. Install the pinion thrust washers and place the pinion gears on the side gear; aligning the holes in the washers and gears with the holes in the case.

4. Install the center block so that the shaft holes are aligned with the holes in the pinion gears and case. The center block has two machined sides and two rough sides.

5. With a brass drift, drive in the long pinion shaft from the outside of the case aligning the lock pin holes in the shaft with the holes in the case. The center block should be positioned so the long shaft is driven through the rough side and short shafts (used with the four pinion differential) driven through the machined side (Fig. 51).

6. With a suitable drift, install the shaft lock pins. Make sure the pinion and side gears move freely.

7. Place the four pre-load springs in the holes provided in the center block.

8. Position a pre-load plate over the four springs, making sure the springs are properly seated. The pre-load plate straddles the center block over its narrower or machined width.

9. Mount the differential cover in a soft jawed vise or holding fixture.

10. Insert shim(s) of 0.050 total thickness in the cover cavity.

11. Install the composite plate (friction material on one side and steel on the opposite) on the back side of the clutch hub with the friction material against the hub; next, install a friction plate, then steel, friction, steel, friction, steel, friction, and lastly a steel plate (Figures 3 and 52). When new clutch plates are used, soak the plates in Ford Hypoid Lubricant (Ford Part No. C9AZ-19580-A) for approximately 30 min-

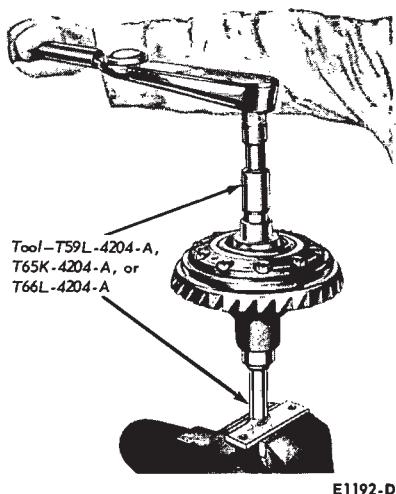


FIG. 54—Checking Traction-Lok Differential Torque

utes before installation.

12. Place the clutch hub with the clutch plates into the clutch ear cavities in the differential cover. Make sure that the splines on the last friction plate are engaged on the hub.

13. Obtain locally a 5/8 inch x 2 1/2 inch or 9/16 inch x 2 1/2 inch bolt, nut and two 1 1/2 inch outside diameter flat washers approx. 1/8

inch in thickness. These parts are required to compress the clutch pack in order to obtain the proper shim selection.

Install a flat washer on the bolt, and place the bolt through the clutch hub. Hold the bolt in position and turn the cover over. Place a flat washer on the bolt and then install the nut. Be sure the washers are centered, and torque the nut 10 to 15 ft-lbs (Fig. 53).

14. Place the shim template tool (Ford Tool No. T68P-4946-A) in the clutch hub. Some clearance should be observed between the shim tool and the cover-to-case mating surface. Using a feeler gauge, determine the exact amount of clearance. Refer to the shim pack thickness chart specifications which will indicate the correct amount of shim(s) to subtract from the 0.050 shim originally installed. In order to correctly select the proper shim(s), the shim template tool and the chart must be used.

15. After the proper shim selection is determined, remove the bolt, nut and flat washers. If it is necessary to revise the shim thickness, remove the clutch hub and clutch plates.

16. Install the selected shim(s) in

the cover cavity, reinstall the components as outlined in Steps 11 and 12.

17. Install the four steel clutch ear guides and side gear.

18. Place both assemblies in a press, and press the two halves together; then, insert the two Allen or Phillips head screws, and tighten evenly until tight. If a press is not available, any two stock bolts and nuts may be used opposite each other in the ring gear retaining holes to compress both halves.

19. Install the ring gear and ring gear bolts and washers. Tighten evenly and alternately across the diameter of the ring gear. Torque the bolts to 65-80 ft-lbs.

20. Prior to installation of the torque sensitive locking differential into a vehicle, a bench torque check must be made. Check the torque required to rotate one side gear while the other is held stationary (Fig. 54). The initial break-away torque may exceed 250 ft-lbs. The rotating torque required to keep the side gear turning with new clutch plates is 100 to 250 ft-lbs. With re-used clutch plates, the minimum torque required is 40 ft-lbs. (The torque may fluctuate 10-40 ft-lbs.).

5 SPECIFICATIONS

DRIVING AXLE IDENTIFICATION-FORD, MERCURY, METEOR

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ②
WDC-CA4	2.75:1	9	C2	WFG-A	2.75:1	9	T2
WDC-CC4	3.00:1	9	C4	WFG-C	3.25:1	9	T2
WDC-CK4	3.25:1	9	C2	WFG-D	2.75:1	9	T4
WDC-CN	2.75:1	9	C4	WFG-E	3.25:1	9	T4
WDC-CR	3.25:1	9	C4	WFH-A	3.25:1	9-3/8	T2
WDT-F4	2.80:1	9-3/8	C2	WFH-B	2.80:1	9-3/8	T2
WDT-R4	3.25:1	9-3/8	C2	WFH-C	3.25:1	9-3/8	T2
WDT-AL4	3.25:1	9-3/8	C2	WFH-D	3.00:1	9-3/8	T2
WDT-AU	3.00:1	9-3/8	C2				

① Type: C2-Conventional Differential-2 Pinion
C4-Conventional Differential-4 Pinion

T2-Traction-Lok Differential-2 Pinion
T4-Traction-Lok Differential-4 Pinion

DRIVING AXLE IDENTIFICATION-FAIRLANE, MONTEGO

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①
WDW-B1	3.00:1	8	C2	WEC-S	3.25:1	9	C4
WDW-C1	3.25:1	8	C2	WFA-D	3.25:1	9	T4
WDW-K1	2.79:1	8	C2	WFA-E	3.25:1	9	T4
WDY-A1	3.00:1	8	C2	WFA-G	3.00:1	9	T4
WDY-B1	3.25:1	8	C2	WFA-H	3.00:1	9	T4
WEB-E	3.00:1	9	C4	WFA-J	3.00:1	9	T4
WEB-H	2.75:1	9	C2	WFC-B	3.91:1	9	T4
WEB-L	3.50:1	9	C4	WFC-C	4.30:1	9	T4
WEB-M	3.00:1	9	C4	WFC-F	3.91:1	9	T4
WEB-R	3.00:1	9	C2	WFC-G	3.00:1	9	T4
WEB-T	3.25:1	9	C4	WFC-J	3.50:1	9	T4
WEB-Z	3.00:1	9	C4	WFC-L	3.50:1	9	T4
WEB-AA	3.25:1	9	C4	WFC-N	3.25:1	9	T4
WEC-D	3.00:1	9	C4	WFC-R	3.25:1	9	T4
WEC-H	3.00:1	9	C4	WFK-A	3.00:1	8	T2
WEC-K	3.00:1	9	C2	WFK-B	3.25:1	8	T2
WEC-L	3.25:1	9	C4	WFJ-A	3.00:1	8	T2
WEC-R	3.50:1	9	C4				

① Type: C2-Conventional Differential-2 Pinion
C4-Conventional Differential-4 Pinion

T2-Traction-Lok Differential-2 Pinion
T4-Traction-Lok Differential-4 Pinion

CE1932-B

DRIVING AXLE IDENTIFICATION-MUSTANG, COUGAR, MAVERICK

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①
WCZ-F1	3.00:1	8	C2	WES-AJ	3.25:1	9	C4
WCZ-V	2.79:1	8	C2	WFB-C	3.25:1	9	T4
WDW-F	3.00:1	8	C2	WFB-D	3.00:1	9	T4
WDW-J	2.79:1	8	C2	WFD-A	3.50:1	9	T4
WES-F	3.00:1	9	C4	WFD-B	3.91:1	9	T4
WES-M	3.25:1	9	C4	WFD-C	4.30:1	9	T4
WES-T1	2.75:1	9	C2	WFD-D	3.91:1	9	T4
WES-AA	3.00:1	9	C2	WFD-E	4.30:1	9	T4
WES-AB	3.25:1	9	C2	WFD-F	3.50:1	9	T4
WES-AC	3.00:1	9	C4	WFD-L	3.00:1	9	T4
WES-AD	3.25:1	9	C4	WFL-A	3.00:1	8	T2
WES-AE	3.50:1	9	C4	WFS-A	3.00:1	8	T2
WES-AH	3.00:1	9	C4				

① Type: C2-Conventional Differential-2 Pinion
C4-Conventional Differential-4 Pinion

T2-Traction-Lok Differential-2 Pinion
T4-Traction-Lok Differential-4 Pinion

CE1933-B

DRIVING AXLE IDENTIFICATION-LINCOLN CONTINENTAL, CONTINENTAL MARK III, THUNDERBIRD

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①
WEG-M	2.80:1	9-3/8	C2	WGA-F1	3.00:1	9-3/8	C2
WEG-N	3.00:1	9-3/8	C2	WGA-J	3.25:1	9-3/8	C2
WEG-R	2.80:1	9-3/8	C2	WGA-K	3.25:1	9-3/8	C2
WEG-S	3.80:1	9-3/8	C2	WFN-A	2.80:1	9-3/8	T2
WFM-C	2.80:1	9-3/8	T2	WFN-B	3.00:1	9-3/8	T2
WFM-D	3.00:1	9-3/8	T2	WFN-C	3.25:1	9-3/8	T2
WFM-E	2.80:1	9-3/8	T2	WFN-E1	3.25:1	9-3/8	T2
WGA-A	2.80:1	9-3/8	C2	WFN-F	3.00:1	9-3/8	T2
WGA-B	3.00:1	9-3/8	C2	WFN-G	2.80:1	9-3/8	T2
WGA-E1	2.80:1	9-3/8	C2				

① Type: C2-Conventional Differential-2 Pinion

T2-Traction-Lok Differential-2 Pinion

CE1934-B

ADJUSTMENT TORQUE SPECIFICATIONS

Description (Dimensions in inches)	Torque		Description (Dimensions in inches)	Torque	
	In. Lbs.	Ft. Lbs.		In. Lbs.	Ft. Lbs.
Minimum torque required to tighten pinion flange nut to obtain correct pinion bearing preload 8, 8 3/4, 9, 9 3/8 (collapsible spacer) 9, 9 3/8 (solid spacer)			Pinion Bearing Preload- (Solid Spacer) 9, 9 3/8	13-33	
Pinion-Bearing Preload- (Collapsible spacer)② Original Bearings 8, 8 3/4, 9, 9 3/8 New Bearings 8, 8 3/4, 9 & 9 3/8	8-14 20-30	175③ 180-220	Rotating Torques required during bench check after assembly or in vehicle with one wheel on the ground: Original Clutch Plates Traction-Lok-(All) New Clutch Plates Traction-Lok-(All)	40 Min. 100-250③	

①If pinion bearing preload exceeds specification before this torque is obtained, install a new spacer.

②With Oil Seal. ③Rotating torque may fluctuate up to 40 Ft.-Lbs.

CE1937-A

CLEARANCE, TOLERANCE AND ADJUSTMENTS SPECIFICATIONS

Description (Dimensions in Inches)	Inches	Description (Dimensions in Inches)	Inches
Maximum Runout of Backface of Ring Gear (All)	0.003	Nominal Pinion Locating Shim- 8 3/4, 9 & 9 3/8 Ring Gear	0.015
Differential Side Gear Thrust Washer Thickness (All)	0.030-0.032	8 Ring Gear	0.022
Differential Pinion Gear Thrust Washer Thickness (All)	0.030-0.032	Available pinion Gear Shims in steps of 0.001 8 3/4, 9, 9 3/8	0.010-0.029
Drive Pinion Bearing Solid Spacers- (9-3/8 only) 6 spacers in increments of 0.002	0.466-0.476	Backlash between ring gear and pinion teeth (All)	0.008-0.012
14 spacers in increments of 0.001	0.477-0.490	Maximum backlash variation between teeth (All)	0.003
Differential Bearing Preload (Case spread across Differential) New Bearings (All) Original Bearings (All)	0.008-0.012 0.005-0.008	Maximum radial runout of U-joint flange in assembly All except 9 3/8 and circular piloted flange 9 3/8 and circular piloted flange	0.010-T.I.R. 0.005-T.I.R.
		Circular piloted flange Lateral Runout	0.005-T.I.R.

CE1938-A

ATTACHING TORQUE SPECIFICATIONS

Description (Dimensions in Inches)	Torque Ft. Lbs.	Description (Dimensions in Inches)	Torque Ft. Lbs.
Differential Bearing Cap Bolts 8 3/4, 9 9 3/8	70-85 60-70	Oil Filter Plug (All)	25-50
Differential Bearing Adjusting Nut Lock Bolts (All)	12-25	Rear Axle Shaft Bearing Retainer Bolt Nuts: Maverick, Falcon, Fairlane, Montego, 9 Mustang and Cougar 8	20-40 50-75
Carrier to Housing Stud Nuts (All)	25-40	Ford & Meteor Mercury, T'Bird, Lincoln Continental, Continental Mark III	50-75
Pinion Retainer to Carrier Bolts (All)	30-45	Universal Joint to Drive Pinion Companion Flange Bolt Nuts All Exert Circular Flange Circular Flange	12-15 70-90
Ring Gear Attaching Bolts (All)	65-80		

CE1939-A

TRACTION-LOK DIFFERENTIAL SHIM PACK THICKNESS CHART

Feeler Gauge Reading (Inches)①	Remove Shim(s) From Nominal	Total Req'd Shim Pack Thickness (Inches)②	Feeler Gauge Reading (Inches)①	Remove Shim(s) From Nominal	Total Req'd Shim Pack Thickness (Inches)②
0.001-0.002	None	0.050	0.028-0.032	0.030	0.020
0.003-0.007	0.005	0.045	0.033-0.037	0.035	0.015
0.008-0.012	0.010	0.040	0.038-0.042	0.040	0.010
0.013-0.017	0.015	0.035	0.043-0.047	0.045	0.005
0.018-0.022	0.020	0.030	0.048-0.050	0.050	0.000
0.023-0.027	0.025	0.025			

① With clutch hub, shims and clutch plates compressed 10-15 ft.-lbs.

② Service shims are available in 0.010 inch and 0.005 inch thicknesses.

CE1940-A

LUBRICANT CAPACITIES AND CHECKING PROCEDURES

Vehicle	Engine (C.I.D.)	Axle	U.S. Measure- Capacity (Pints)①②	Imperial Capacity③ (Pints)
Cougar, Fairlane, Falcon Montego, Mustang	250, 302-2V	All	4.0	3 1/5
Ford, Meteor	240, 302-2V	All Except WER Axles	5.0	4.0
Cougar, Fairlane, Falcon, Ford, Mercury, Meteor, Montego Mustang	302-4V, 351, 390, 428, 429	All	5.0	4.0
Lincoln Continental, Thunder- and Continental Mark III	429, 460	All	5.0 ④	4.0 ④

① All Traction-Lok axles use ESW-M2C-119-A (C9AZ-19580-A).
 All conventional axles use ESW-M2C-105-A lubricant (C6AZ-19580-B).
 ② Approximate refill capacity—Actual lubricant capacities are determined by filling to bottom of filler hole except WER axle, which is 1/2 inch below filler plug hole and 7 1/4 inch axle which is 1/4 inch below filler plug hole.
 ③ To check these axles, the plug should be backed out slowly. If seepage occurs around the threads, the plug should be turned back in immediately to avoid any drainage. This indicates that the specified amount of lubricant is present in the axle.

CE1941-A

PART 15-03 Driving Axles—Integral Carrier Type (Except Ford Light Duty WER Axle)

COMPONENT INDEX Applies Only to Falcon, Maverick, Mustang	All Models Listed	COMPONENT INDEX Applies Only to Falcon, Maverick, Mustang	All Models Listed
AXLE HOUSING Cleaning and Inspection	01-09	PINION AND RING GEAR Cleaning and Inspection	01-10
Removal and Installation	03-06	Removal and Installation	03-08
AXLE SHAFT Cleaning and Inspection	01-10	PINION BEARING CUPS Cleaning and Inspection	01-10
Removal and Installation	03-02	Removal and Installation	03-08
CONVENTIONAL DIFFERENTIAL CASE Cleaning and Inspection	01-10	PINION OIL SEAL Removal and Installation	03-03
Disassembly and Overhaul	03-08	REAR WHEEL BEARINGS AND SEALS Cleaning and Inspection	01-10
Removal and Installation	03-07	Removal and Installation	03-02
DIFFERENTIAL BEARINGS AND RING GEAR Cleaning and Inspection	01-10	U-JOINT FLANGE Cleaning and Inspection	01-10
Removal and Installation	03-08	Removal and Installation	03-05

A page number indicates that the item is for the vehicle(s) listed at the head of the column.

1 DESCRIPTION

The rear axle assembly is an integral-type housing, hypoid design, with the centerline of the pinion set below the centerline of the ring gear (Fig. 1).

The semi-floating axle shafts are retained in the housing by ball bearings and a bearing retainer at the axle housing outer ends.

The differential assembly is mounted on two opposed tapered roller bearings. The bearings are retained in

the housing by removable caps. Differential bearing preload and drive gear backlash is adjusted by nuts located behind each differential bearing cup.

The drive pinion assembly is mounted on two opposed tapered roller bearings. Pinion bearing preload is adjusted by a collapsible spacer on the pinion shaft. Pinion and ring gear tooth contact is adjusted by shims between the rear rear bearing cone

and pinion gear.

A cover on the rear of the differential housing provides access for inspection and removal and installation of the differential assembly and drive pinion.

An identification tag is attached to one of the rear cover-to-housing retaining bolts (Fig. 2). It is important to use the axle model designation if necessary to obtain correct replacement parts.

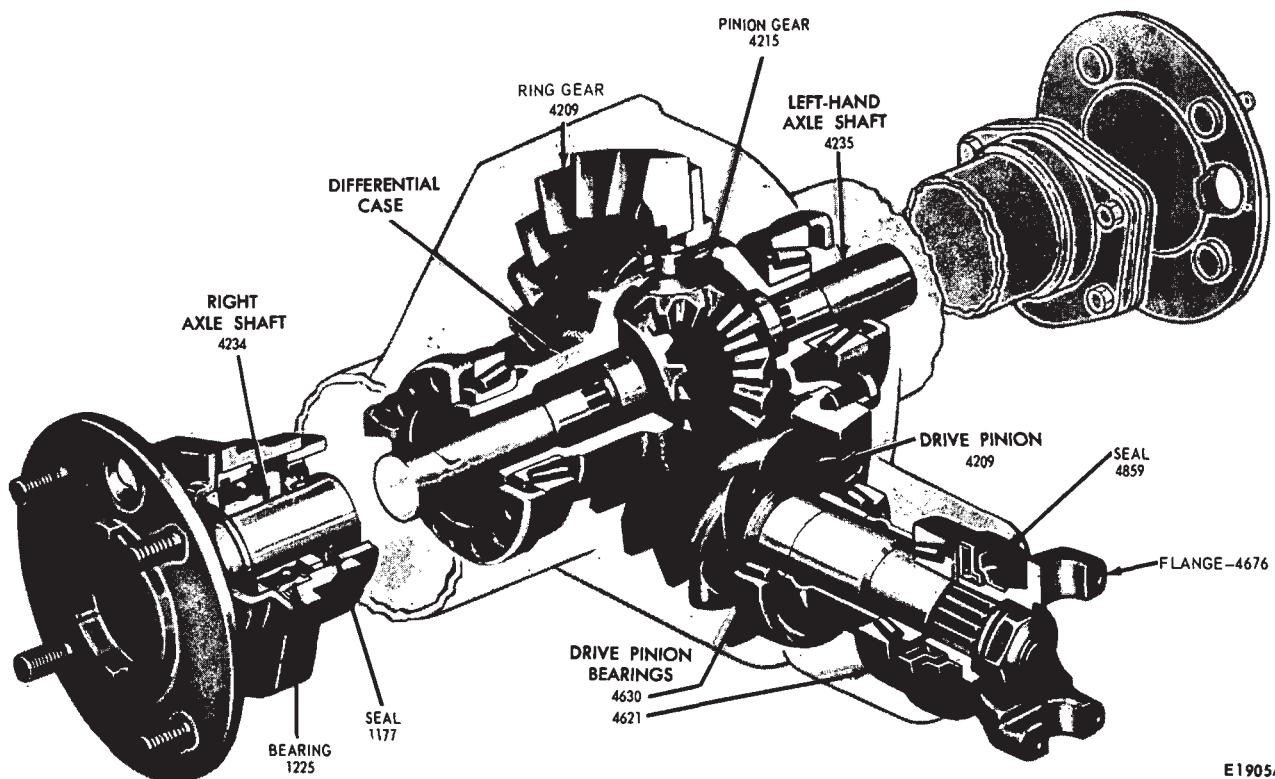


FIG. 1 — Typical Rear Axle Assembly

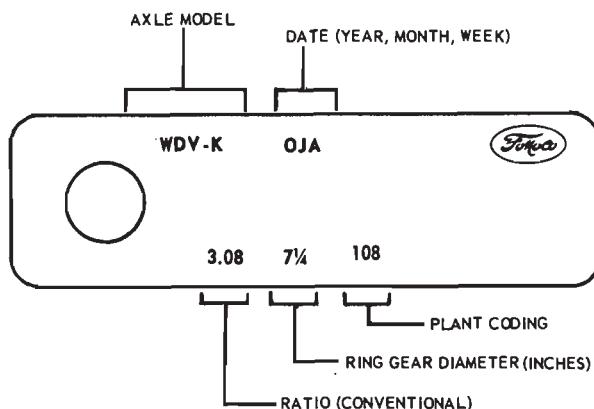


FIG. 2—Rear Driving Axle Model Identification Tag

2 IN-VEHICLE ADJUSTMENT AND REPAIR

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

Removal and insertion of rear axle

shafts must be performed with caution. The entire length of the shaft (including spline) up to the seal journal must pass through the seal without contact. Any roughing or cutting

of the seal element during axle removal or installation will result in early seal failure.

The rear axle shafts, wheel bearings, and oil seal can be replaced

without removing the differential assembly from the axle housing. Removal of the wheel bearings from the axle shafts make them unfit for further use.

1. Remove the wheel cover, wheel and tire from the brake drum.

2. Remove the Tinnerman nuts that secure the brake drum to the axle housing flange, and then remove the drum from the flange.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the wheel bearing retainer plate. Then pull the axle shaft assembly out of the axle housing (Fig. 3). The brake backing plate must not be dislodged. Install one nut to hold the plate in place

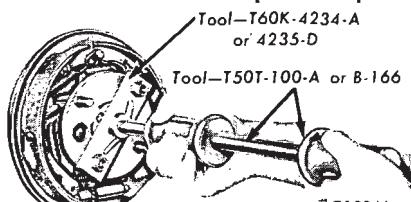


FIG. 3—Removing Axle Shaft

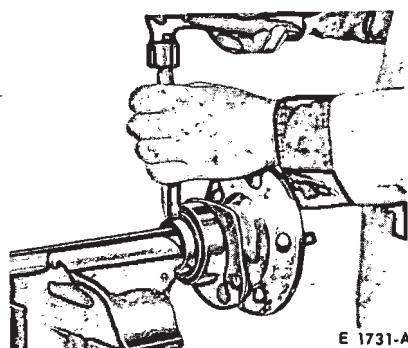


FIG. 4—Removing Rear Wheel Bearing Retainer Ring

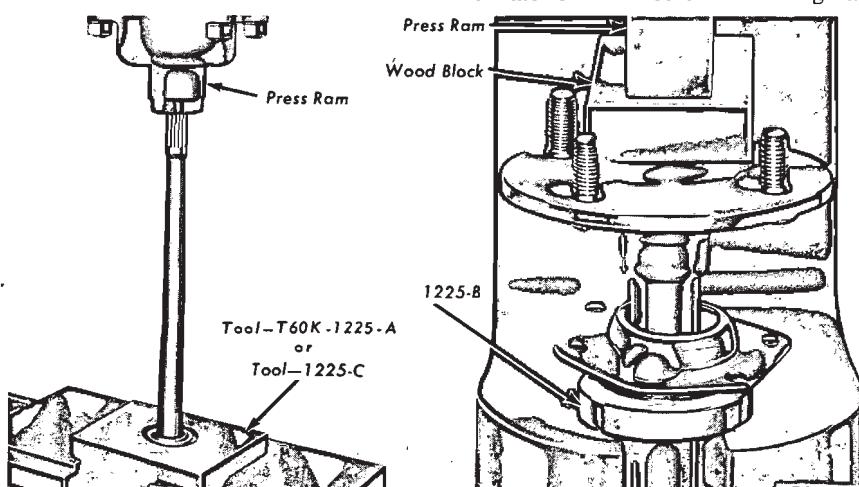


FIG. 5—Removing and Installing Rear Wheel Bearing

after the axle shaft is removed.

4. If the rear wheel bearing is to be replaced, loosen the inner retainer ring by nicking it deeply with a cold chisel in several places (Fig. 4). It will then slide off easily.

5. Remove the bearing from the axle shaft with the tool shown in Fig. 5 or 6. If the push-puller operation shown in Fig. 6 is used, be sure that the puller arms contact the flat surface of the axle shaft flange rather than the bolt heads. Also with this method, be careful not to damage or burr the oil seal journal as the bearing breaks loose.

6. Whenever a rear axle shaft is replaced the oil seal must be replaced. Remove the seal with the tools shown in Fig. 9.

7. Inspect the machined surfaces of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or damage. Carefully remove any burrs or rough spots. Replace worn or damaged parts.

8. Lightly coat wheel bearing bores with axle lubricant.

9. Place the retainer plate on the axle shaft, and press the new wheel bearing on the shaft with the tool shown in Fig. 5 or 6. The bearing should seat firmly against the shaft shoulder. Do not attempt to press on both the bearing and the inner retainer ring at the same time.

10. Using the bearing installation tool, press the bearing inner retainer ring on the shaft until the retainer seats firmly against the bearing.

11. Wipe all lubricant from the inside of the axle housing in the area of the oil seal before installing the

new seal.

12. Wipe a small amount of oil resistant sealer on the outer edge of the seal before it is installed. Do not put sealer on the sealing lip.

13. Install the new oil seal with the tools shown in Fig. 9. Installation without use of the proper tool will distort the seal and cause leakage.

14. Carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the side gear, and push the shaft in until the bearing bottoms in the housing.

15. Install the bearing retainer plate on the mounting bolts at the axle housing, and install the attaching nuts. Torque the nuts to specifications.

16. Install the brake drum and the drum retaining nuts.

17. Install the wheel and tire on the drum, and install the wheel cover.

REMOVAL AND REPLACEMENT OF DRIVE PINION OIL SEAL

Synthetic seals must not be cleaned, soaked or washed in cleaning solvent.

Replacement of the pinion oil seal involves removal and installation of only the pinion shaft nut and the universal joint flange. However, this operation disturbs the pinion bearing preload, and this preload must be carefully reset when assembling.

1. Raise the vehicle and install safety stands. Remove the rear wheels and brake drums.

2. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 15). Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut (Fig. 7). Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 10, remove the

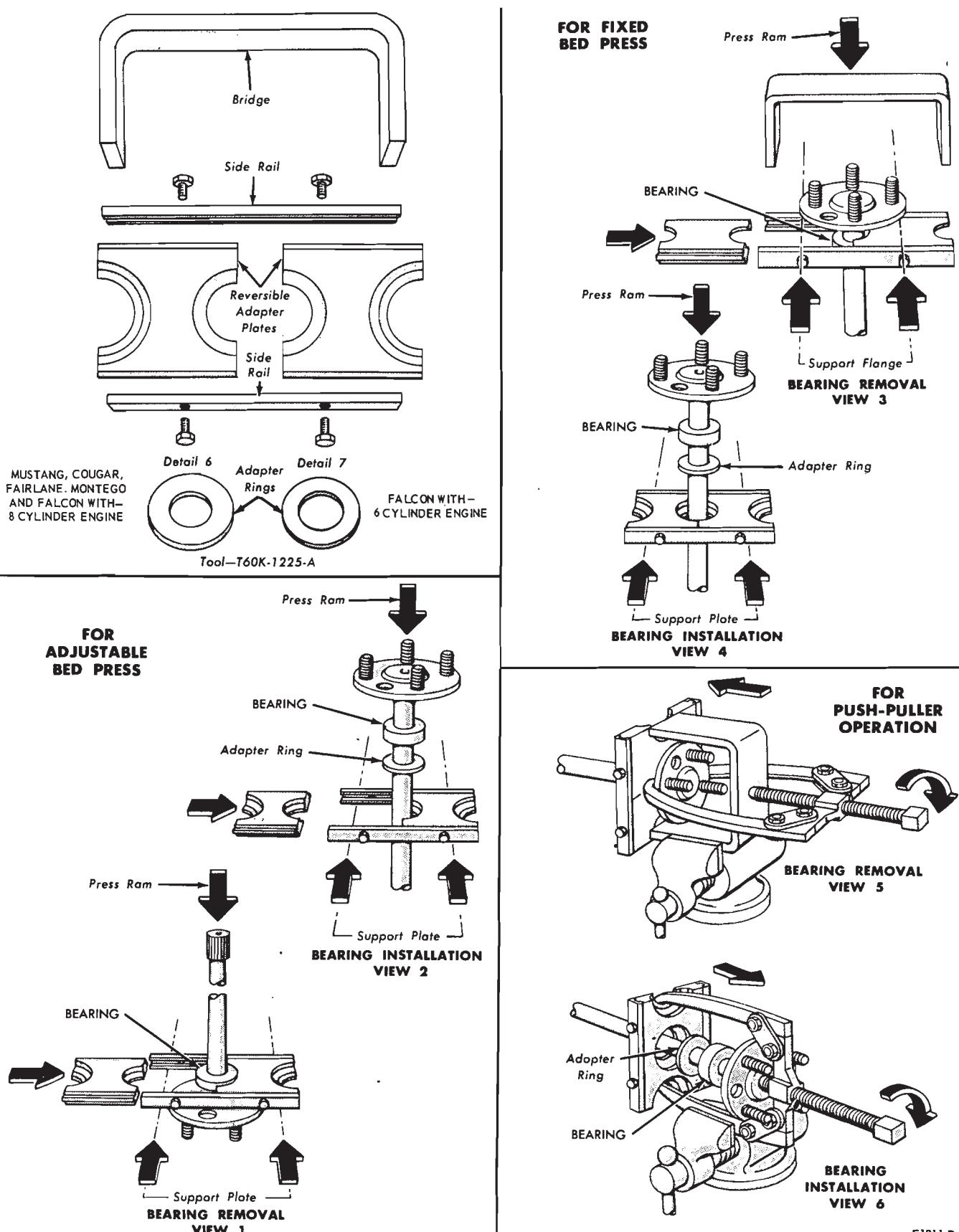


FIG. 6—Removing and Installing Rear Wheel Bearing—Falcon, Mustang and Fairlane

E1211-D

integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear.

6. Using the tool shown in Fig. 11, remove the pinion U-joint flange.

7. Using the tool shown in Fig. 8, remove the drive pinion oil seal.

8. Clean the oil seal seat.

9. Pinion oil seals have pre-applied oil resistant sealer. Install the seal in the retainer using the tool shown in Fig. 12.

10. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in

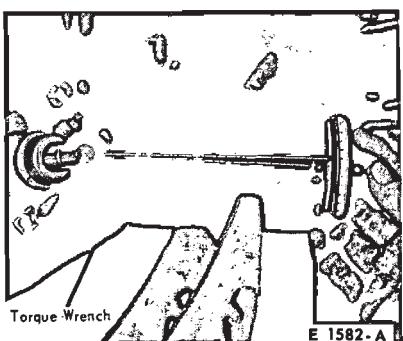


FIG. 7—Checking Pinion Bearing Preload

a rotational motion. Wipe the pinion shaft clean.

11. Apply a small amount of lubricant to the U-joint splines.

12. Align the punch mark on the U-joint flange with the mark on the end of the pinion shaft, and install the flange.

13. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

14. Hold the flange with the tool shown in Fig. 10 while tightening the nut.

15. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings (Fig. 7) until the preload is at the original recorded reading established in step 3.

16. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 6 to 12 in-lbs has been added.

The preload should not exceed the amount indicated above, or bearing failure may result. Under no circumstances should the pinion nut be backed-off to lessen preload. If this is done, a new pinion bearing spacer must be installed. In addition, the U-joint flange must never be hammered on, or power tools used.

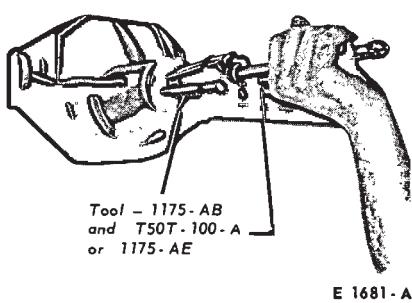


FIG. 8—Removing Pinion Seal

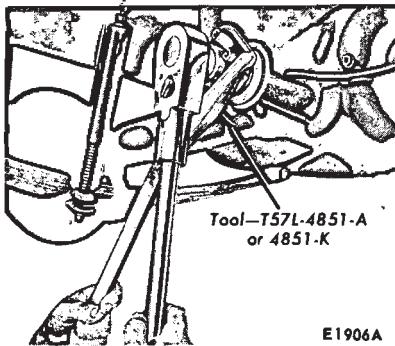


FIG. 10—Removing or Installing Drive Pinion Nut

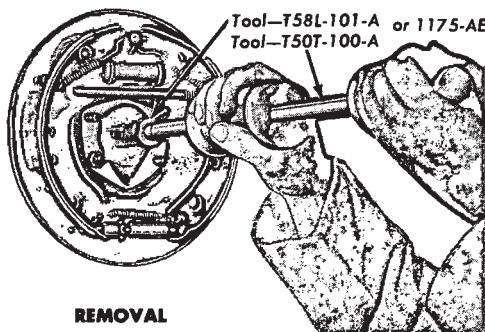


FIG. 9—Removing and Installing Axle Shaft Seal

17. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

18. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the punch marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 15).

19. Check the lubricant level. Make sure the axle is in running position. Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole, located in the carrier casting or the housing cover.

REMOVAL AND INSTALLATION OF THE ORIGINAL U-JOINT FLANGE

Use procedure as outlined under drive pinion oil seal replacement.

INSTALLATION OF A NEW UNIVERSAL JOINT FLANGE

1. Raise the vehicle and install safety stands. Remove both rear wheels and brake drums.

2. Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when

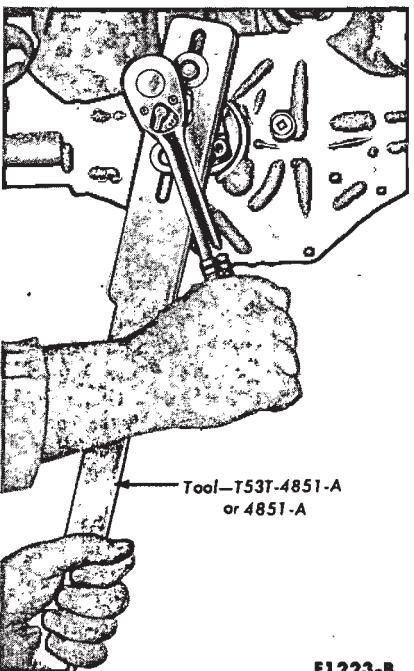


FIG. 11—Typical Drive Pinion Flange Removal

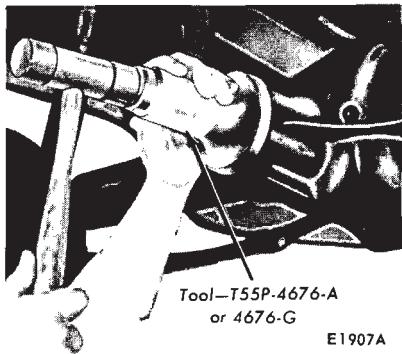


FIG. 12—Typical Drive Pinion Flange Seal Installation

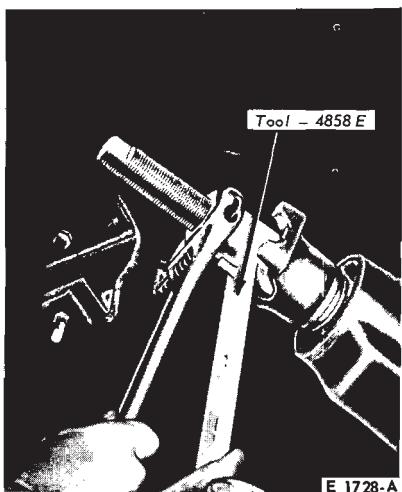


FIG. 13—U-Joint Flange Installation

they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission fluid leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut (Fig. 7). Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 10, remove the integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the vehicle higher than the rear. Synthetic seals must not be cleaned, soaked or washed in cleaning solvents.

6. Using the tool shown in Fig. 11, remove the U-joint flange.

7. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in rotational motion, then wipe clean.

Apply a small amount of lubricant to U-joint splines.

8. Install the U-joint flange using the tool shown in Fig. 13.

9. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

10. Hold the flange with the tool

shown in Fig. 10 while the nut is being tightened.

11. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, (Fig. 7) and take frequent preload readings until the preload is at the original recorded reading established in step 3.

12. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 6 to 12 in-lbs has been added.

The preload should not exceed the amount shown above, or bearing failure may result.

Under no circumstances should the pinion nut be backed off to lessen preload. If this is done, a new pinion bearing spacer must be installed. (In addition, the U-joint flange must never be hammered on, or pneumatic tools used.)

13. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

14. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 15).

15. Check the lubricant level. Make sure the axle is in running position. Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole, located in the carrier casting.

3 REMOVAL AND INSTALLATION

REAR AXLE HOUSING

REMOVAL

1. Raise the vehicle and support it with safety stands under the rear frame member.

2. Drain the lubricant from the axle.

3. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 15). Disconnect the drive shaft at the drive pinion flange.

4. Disconnect the lower end of the shock absorbers.

5. Remove the wheels, brake drums and both axle shafts as outlined in the foregoing Section 2.

6. Remove vent hose front vent tube (Corbin clamp) and remove vent tube from brake tube junction and axle housing.

7. Remove the hydraulic brake T-fitting from the axle housing. Do not open the hydraulic brake system lines. Remove the hydraulic brake line from its retaining clip on the axle housing.

8. Remove both axle shaft oil seals with the tools shown in Fig. 9.

9. Remove both brake backing plates from the axle housing and suspend them above the housing with mechanic's wire. The hydraulic brake lines and the parking brake cables are still attached to the brake carrier plates.

10. Support the rear axle housing on a jack, and then remove the spring

clip nuts. Remove the spring clip plates (Fig. 14).

11. Lower the axle housing and remove it from under the vehicle.

12. If the axle housing is being replaced, transfer all the differential and pinion parts to the new housing. See Section 4, Major Repair Operations.

INSTALLATION

1. Raise the axle housing into position so that the spring clip plates can be installed. On a Montego or Fairlane, position the spring upper insulators and retainers between the axle housing and springs and install the lower insulators. Torque the spring clip nuts to specification.

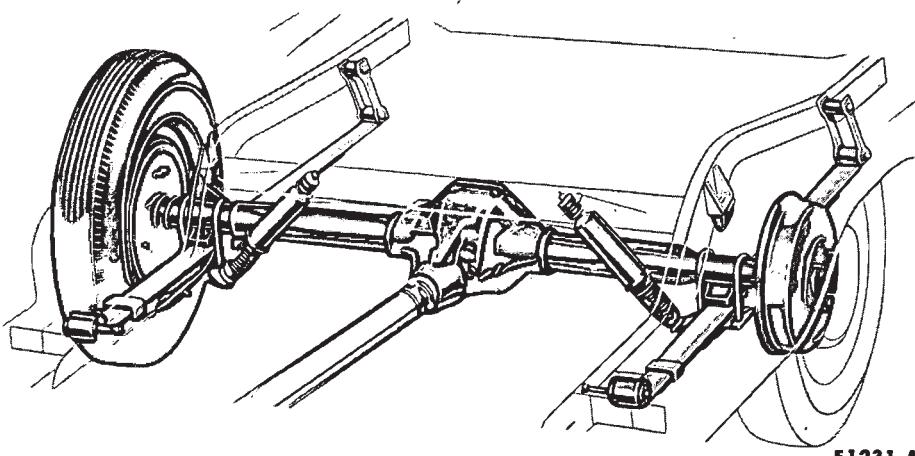
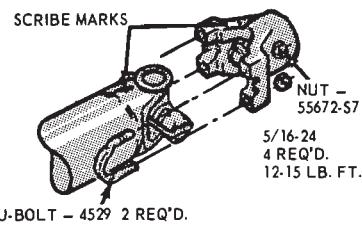


FIG. 14—Rear Axle Installation—Typical



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FIG. 15—Drive Shaft-to-Axle U-Joint Connection

junction and install vent hose to vent tube.

7. Raise the axle housing and connect the shock absorbers.

8. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 15).

9. Fill the axle with the proper grade and amount of lubricant.

10. Road test the vehicle.

2. Place the brake backing plates in their normal position on the axle housing. Use new gaskets on each side of the brake backing plates.
3. Install new axle shaft oil seals with the tool shown in Fig. 9. Installation without use of the proper tool will distort the seal and cause leakage. Coat the outside edges of the new oil seal with a nonhardening type

of sealer such as Permatex No. 2 or its equivalent.

4. Install the axle shafts, brake drums and wheels as outlined in Section 2.

5. Attach the hydraulic brake line T fitting to the axle housing, and secure the hydraulic brake line in its retainer on the axle housing.

6. Install vent tube to brake tube

4 MAJOR REPAIR OPERATIONS

DISASSEMBLY

All service operations on the differential case assembly and the drive pinion assembly can be performed with the housing in the vehicle.

REMOVAL OF DIFFERENTIAL CASE AND DRIVE PINION

1. Raise the vehicle and support it on the underbody, so that the rear axle drops down as far as the springs and shock absorbers permit.

2. Remove the cover from the carrier casting rear face, and drain the lubricant.

3. Perform the Inspection Before Disassembly of Carrier in Part 4-1, Section 3.

4. Remove both rear wheels.

5. Remove the brake drums.

6. Working through the hole provided in the axle shaft flange, remove the nuts that attach the wheel bearing retainers to the axle housing.

7. Pull the axle shafts with the tool

shown in Fig. 3. Care must be exercised to prevent damage to the oil seals. Install a nut on one of the brake backing plate attaching bolts to hold the plate to the axle housing after the shaft has been removed. Remove both seals with the tool shown in Fig. 9.

8. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 15). Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

9. Remove the differential bearing adjusting nut locks (Fig. 16).

10. Mark one differential bearing cap and the case (Fig. 17) to help position the parts properly during assembly.

11. Remove the differential bearing cap bolts and bearing caps. Hold the differential case assembly in the housing after the caps are removed.

12. Remove the differential case and bearing cups (Fig. 18).

13. Hold the drive pinion flange and remove the pinion nut (Fig. 10).

14. Remove the pinion flange (Fig. 11).

15. With a soft-faced hammer, drive the pinion out of the front bearing cone and remove it through the rear of the carrier casting.

16. Drive against the pinion front bearing cone and drive the pinion flange seal and the bearing cone out of the front of the carrier casting.

17. To remove and install the pinion rear bearing cone use the tools in Fig. 19 and 20.

18. Measure the shim which is found under the bearing cone with a micrometer. Record the thickness of

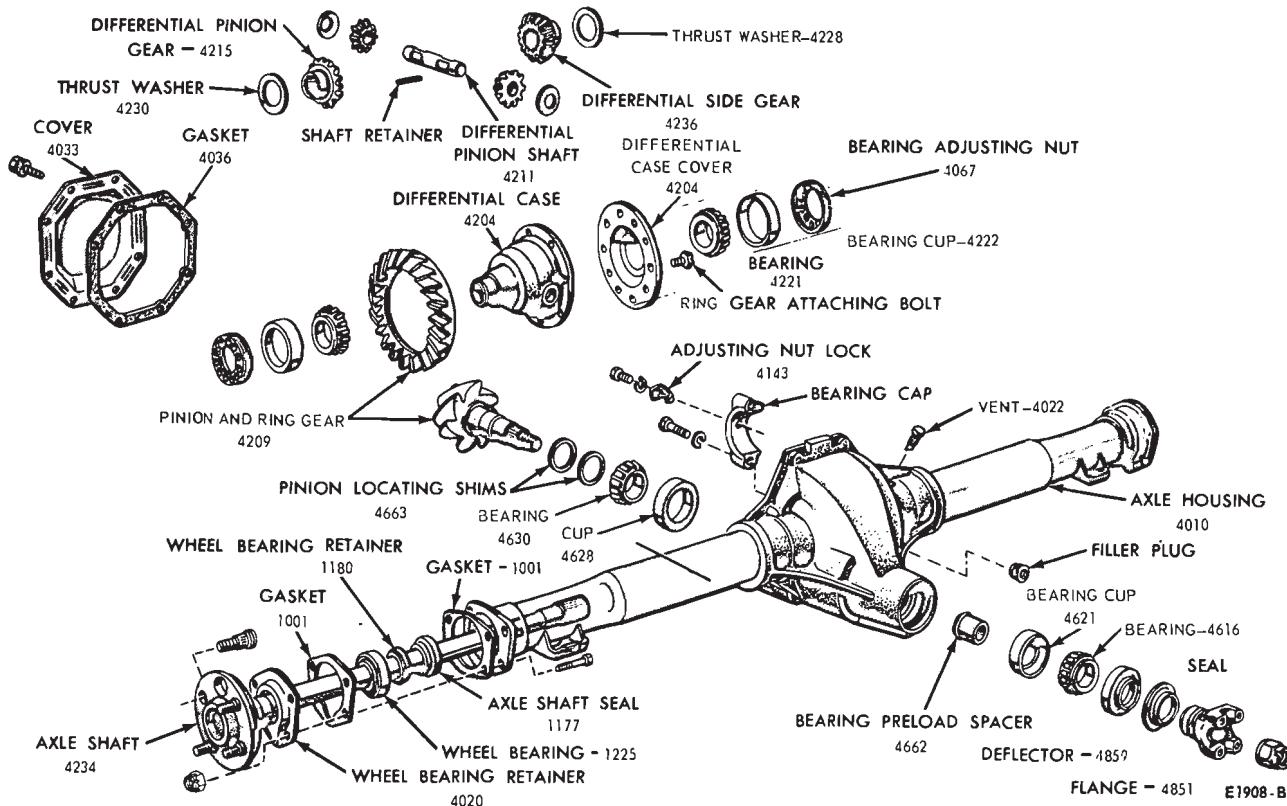


FIG. 16—Disassembled Rear Axle

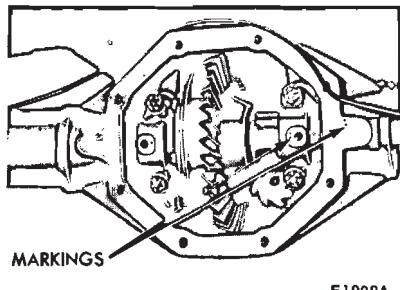


FIG. 17—Typical Differential Bearing Cap Marking

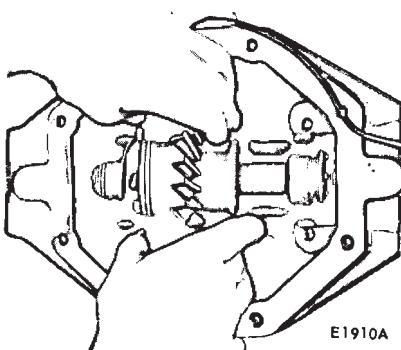


FIG. 18—Differential Case Removal or Installation

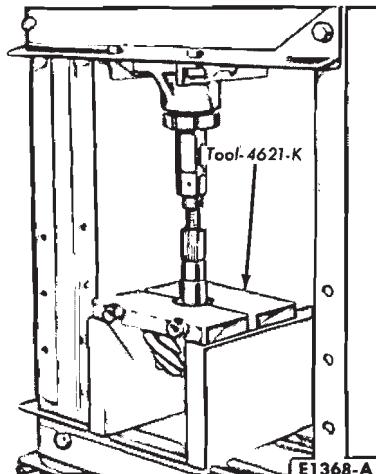


FIG. 19—Removing Pinion Rear Bearing Cone

the shim.

DISASSEMBLY OF DIFFERENTIAL CASE

- If the differential bearings are to be removed, use the tools shown in Fig. 21.
- Remove the bolts that attach the ring gear to the differential case. Press the ring gear from the case or tap it off with a soft-faced hammer.

3. With a drift, drive out the differential pinion shaft lock pin (Fig. 22).

4. Drive out the pinion shaft with a brass drift. Remove the gears and thrust washers.

PARTS REPAIR OR REPLACEMENT

Clean and inspect all the parts as outlined in Part 15-1, Section 3. Before assembling the carrier, repair or replace all parts as indicated by the inspection.

The principal replacement operations are covered in the following procedures. All other repair or replacement operations are performed during Cleaning and Inspection Part 15-1, Section 3, or during the Assembly in this section.

PINION BEARING CUPS

Do not remove the pinion bearing cups from the carrier casting unless the cups are worn or damaged.

If the pinion bearing cups are to be replaced, drive them out of the carrier casting with a drift. Install the new cups with the tool shown in Fig. 23. Make sure the cups are properly seated in their bores. If a 0.0015-inch feeler gauge can be inserted between a

cup and the bottom of its bore at any point around the cup the cup is not properly seated.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

DRIVE PINION AND GEAR SET

Individual differences in machining

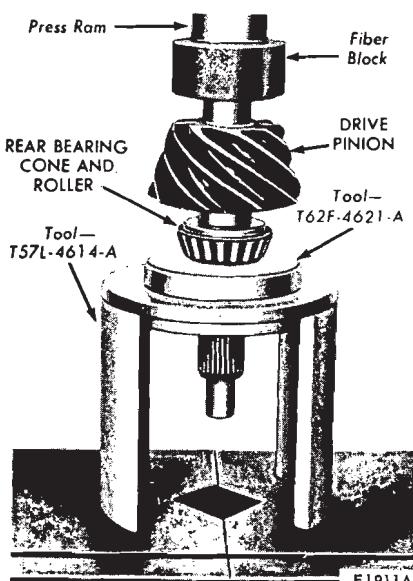


FIG. 20—Installing Pinion Rear Bearing Cone

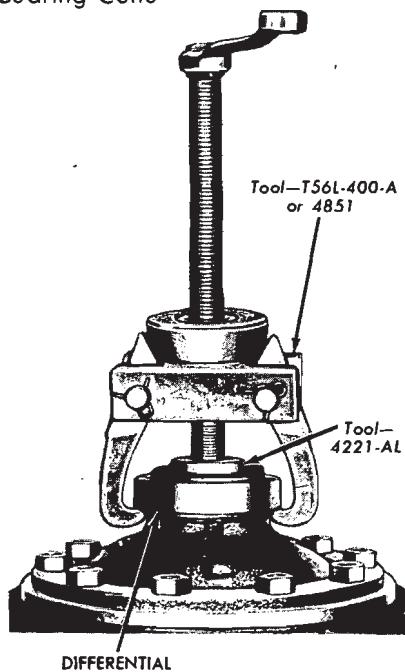


FIG. 21—Differential Bearing Removal

the carrier casting and the gear set require a shim between the pinion rear bearing cone and the pinion gear to locate the pinion for correct tooth contact with the ring gear.

When replacing a ring gear and pinion it should be noted that the original factory installed shim is of the correct thickness to adjust for individual variations in both the carrier casting dimension and in the original gear set dimension; therefore, to se-

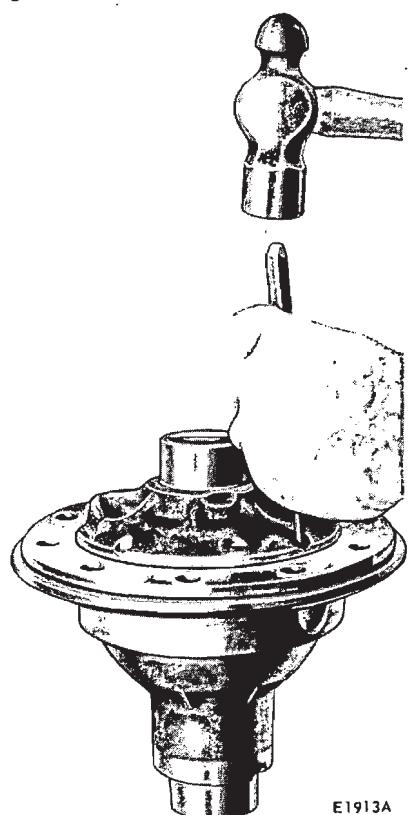


FIG. 22—Differential Pinion Shaft Lock Pin Removal

lect the correct shim thickness for the new gear set to be installed, follow these steps:

- With a micrometer, measure the thickness of the original shim removed from the axle and use the same thickness upon installation of the replacement carrier assembly or drive pinion.

- If further shim change is necessary, it will be indicated in the tooth pattern check.

- If the original shim is lost, substitute a nominal shim for the original and use the tooth pattern check to determine if further shim changes are required. Nominal shim thickness is indicated in Part 15-7, Specifications.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). Be sure the same identifying (matching) number, painted in white, appears on the bolt hole face of the ring gear and on the head of the drive pinion (Fig. 24).

- After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE, BEARINGS, AND RING GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

- Assemble the two halves of the differential case together without the

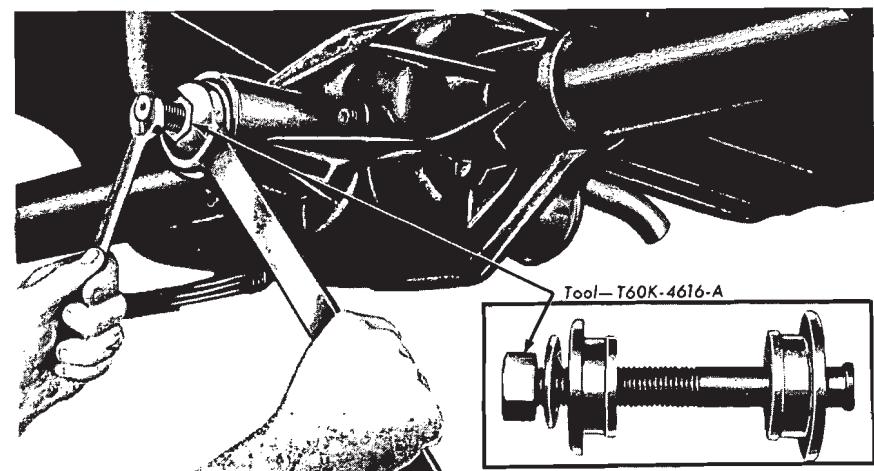


FIG. 23—Pinion Bearing Cup Removal or Installation

ring gear, and press the two differential side bearings on the case hubs.

2. Place the cups on the bearings and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in steps 11 thru 14 under Installation of Drive Pinion and Differential Case in this section.

4. Tighten the right nut two notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 11, Part 15-1, adjust the preload to 0.008 to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if reused.

6. Check the runout of the differential case flange with a dial indicator. If the runout does not now ex-

ceed specifications, install a new ring gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective case or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install new bearings on the case hubs, and again install the differential assembly in the carrier without the ring gear.

9. Check the case runout again with the new bearings. If the runout is now within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is damaged and should be replaced.

washers until the holes in the pinion gears align with the pinion shaft holes in the case.

5. Start the pinion shaft into the differential case. Carefully align the shaft lock pin hole with the pin hole in the case. Drive the shaft into place and install the lock pin (Fig. 22).

6. Place the ring gear on the differential case and install the bolts. Torque the bolts to specification.

7. If the differential bearings have been removed, press them on as shown in Fig. 25.

INSTALLATION OF DRIVE PINION AND DIFFERENTIAL CASE

1. Place the shim and pinion rear bearing cone on the pinion shaft. Press the bearing and shim firmly against the pinion shaft shoulder (Fig. 20).

2. Place a new pinion bearing preload spacer on the pinion shaft.

3. Lubricate the pinion rear bearing with axle lubricant.

4. Lubricate the pinion front bearing cone and place it in the housing.

5. Install a new pinion oil seal in the carrier casting (Fig. 12).

6. Insert the drive pinion shaft flange into the seal and hold it firmly against the pinion front bearing cone. From the rear of the carrier casting, insert the pinion shaft into the flange.

7. Start a new pinion shaft nut. Hold the flange with the tool shown

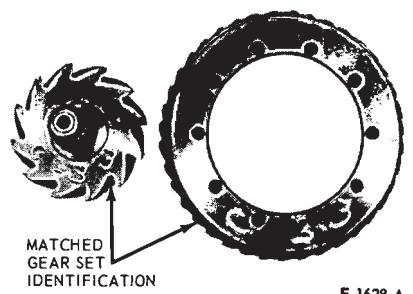


FIG. 24—Pinion and Ring Gear Marking

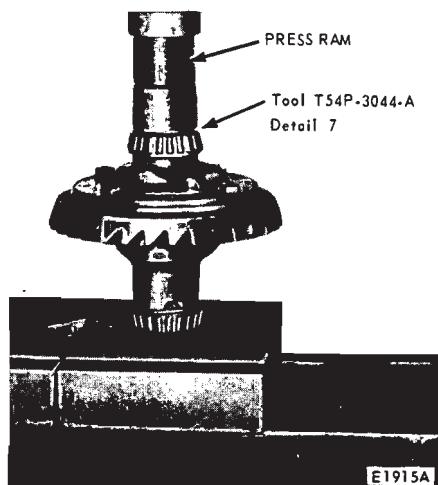


FIG. 25—Differential Bearing Installation



FIG. 26—Typical Gear Set Timing Marks

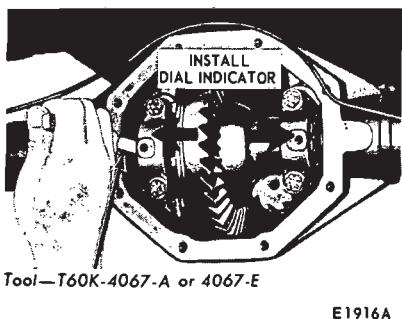


FIG. 27—Backlash and Bearing Pre-Load Adjustment

in Fig. 10 and tighten the pinion shaft nut. As the pinion shaft nut is tightened, the pinion shaft is pulled into the front bearing cone and into the flange.

As the pinion shaft is pulled into the front bearing cone, pinion shaft end play is reduced. While there is still end play in the pinion shaft, the flange and cone will be felt to bottom. This indicates that the bearing cone and flange have bottomed on the collapsible spacer.

From this point, a much greater torque must be applied to turn the pinion shaft nut, since the spacer must be collapsed. From this point, also, the nut should be tightened very slowly and the pinion shaft end play checked often, so that the pinion bearing preload does not exceed the

limits (Fig. 7).

If the pinion shaft nut is tightened to the point that pinion bearing preload exceeds the limits, the pinion shaft must be removed and a new collapsible spacer installed. Do not decrease the preload by loosening the pinion shaft nut. This will remove the compression between the pinion front and rear bearing cones and the collapsible spacer and may permit the front bearing cone to turn on the pinion shaft.

8. As soon as there is preload on the bearings, turn the pinion shaft in both directions several times to set the bearing rollers.

9. Adjust the bearing preload to specification. Measure the preload with the tool shown in Fig. 7.

10. Apply a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

11. Place the cups on the bearings and set the differential case assembly in the carrier casting (Fig. 18).

If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 26.

In almost every case of improper assembly (gears assembled out of time), the noise level and probability of failure will be higher than they

would be with properly assembled gears.

When installing the **hunting** type gear set (no timing marks), assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

12. Slide the case assembly along the bores until a slight amount of backlash is felt between the gear teeth. Hold the differential case in place.

13. Set the adjusting nuts in the bores so that they just contact the bearing cups.

14. Carefully position the bearing caps on the carrier casting. Match the marks made when the caps were removed.

15. Install the bearing cap bolts and lockwashers. As the bolts are tightened, turn the adjusting nut with the tool shown in Fig. 27.

16. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 5 ft-lbs before making adjustments. Refer to Part 15-01 for backlash and bearing preload adjustment procedures.

5 SPECIFICATIONS

DRIVING AXLE IDENTIFICATION (INTEGRAL CARRIER)

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ^①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ^①
WCY-AJ2	3.08:1	7-1/4	C2	WDV-G1	3.08:1	7-1/4	C2
WCY-R1	2.83:1	7-1/4	C2	WDV-J	2.83:1	7-1/4	C2
WDV-B	2.83:1	7-1/4	C2	WDV-K	3.08:1	7-1/4	C2
WDV-G	3.20:1	7-1/4	C2	WDV-L	3.20:1	7-1/4	C2

^① C2 - Conventional Differential - 2 Pinion

ADJUSTMENT TORQUE SPECIFICATIONS (INTEGRAL CARRIER)

Description	Torque	Torque
	In. Lbs.	Ft. Lbs.
Minimum torque required to tighten pinion flange nut to obtain correct pinion bearing preload		140①
Pinion Bearing Preload - (Collapsible spacer) ②Original Bearings New Bearings	6-12 17-32	
① If pinion bearing preload exceeds specification before this torque is obtained, install a new spacer. ② With Oil Seal.		

CE1958-A

CLEARANCE, TOLERANCE AND ADJUSTMENTS (INTEGRAL CARRIER)

Description	Inches	Description	Inches
Maximum Runout of Backface of Ring Gear	0.003	Nominal Pinion Locating Shim	0.017
Differential Side Gear Thrust Washer Thickness	0.030-0.032	Available pinion Gear Shims in steps of 0.001	0.008-0.024
Differential Pinion Gear Thrust Washer Thickness	0.030-0.032	Backlash between ring gear and pinion teeth	0.008-0.012
Differential Bearing Preload (Case spread across Differential) New Bearings Original Bearings	0.008-0.012 0.003-0.005	Maximum backlash variation between teeth	0.003
		Maximum radial runout of U-joint flange in Assembly	0.010-T.I.R.

CE1959-A

ATTACHING TORQUE SPECIFICATIONS (INTEGRAL CARRIER)

Description (Dimensions in Inches)	Torque Ft. Lbs.	Description (Dimensions in Inches)	Torque Ft. Lbs.
Differential Bearing Cap Bolt	40-55		25-35
Differential Bearing Adjusting Nut Lock Bolts	12-25		25-50
Ring Gear Attaching Bolts	40-55		20-40

CE1960-A

LUBRICANT CAPACITIES AND CHECKING PROCEDURES

Vehicle	Engine (C.I.D.)	Axle	U.S. Measure- Capacity ①② (Pints)	Imperial Capacity ①② (Pints)
Falcon, Mustang, Maverick	170, 200	7-1/4 Inch Ring Gear	2.5	2 -
① All conventional axles use ESW-M2C-105-A lubricant (C6AZ-19580-B). ② Approximate refill capacity—Actual lubricant capacities are determined by filling to 1/4 inch below bottom of filler plug hole.				

CE1961-A

PART 15-04 Driving Axles—Integral Carrier, Ford Light Duty (WER)

COMPONENT INDEX Applies Only to Ford and Meteor	All Models Listed	COMPONENT INDEX Applies Only to Ford and Meteor	All Models Listed
AXLE HOUSING Cleaning and Inspection	01-10	DIFFERENTIAL BEARINGS AND DRIVE GEAR Cleaning and Inspection	01-10
Removal and Installation	04-04	Removal and Installation	04-08
AXLE SHAFT Cleaning and Inspection	01-10	PINION AND RING GEAR Cleaning and Inspection	01-10
Removal and Installation	04-03	Removal and Installation	04-07
DESCRIPTION.....	01-01	PINION BEARING CUPS Cleaning and Inspection	01-10
DIFFERENTIAL CASE Cleaning and Inspection	01-10	Removal and Installation	04-08
Disassembly and Overhaul	04-08		
Removal and Installation	04-06		

A page number indicates that the item is for the vehicle(s) listed at the head of the column.

1 DESCRIPTION

A light-duty, integral-carrier, conventional-type rear axle assembly (Fig. 1) is used in Ford and Meteor passenger vehicles equipped with 240-IV and 302 2V engines and related transmissions. The axle (model WER) incorporates the following features:

The hypoid gear set consists of an 8.7 inch diameter ring gear and an overhung drive pinion which is supported by two opposed tapered roller bearings. A drive pinion pilot bearing is not used in this axle.

The differential carrier is the non-removable type, with a stamped bolt-on cover. The filler hole is tapped in the front portion of the carrier casting and uses a 1/2-14 tapered pipe plug

with a 3/8 inch square female drive. A bumper pad is machined on the pinion nose portion of the carrier. The rubber bumper is mounted on the vehicle underbody.

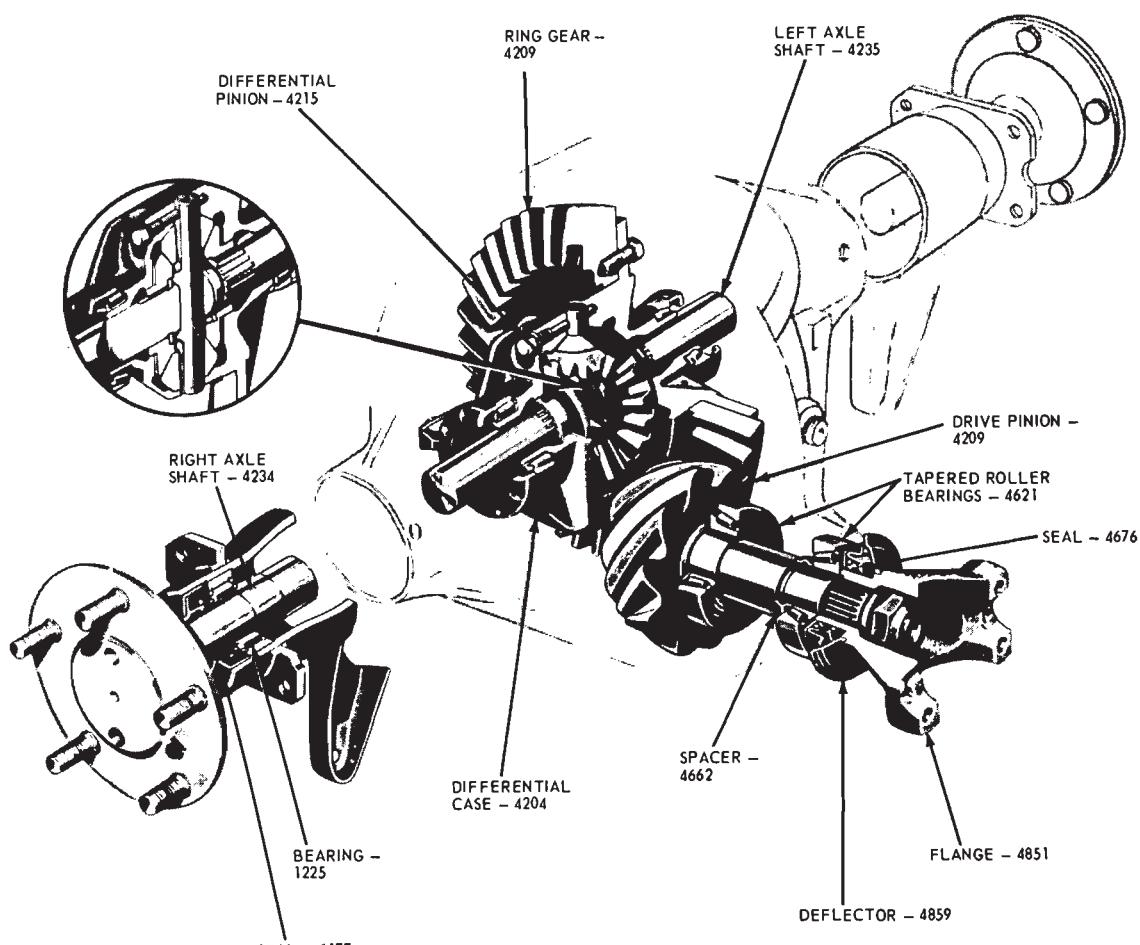
The differential case is a one-piece design, with openings allowing assembly of the internal components and lubricant flow. The differential pinion shaft is retained with a threaded bolt (lock) assembled to the case.

The axle housing assembly consists of tube assemblies pressed and welded into the differential casting. The brake backing plate retainer is welded inboard of the outer edges of the tubes, and allows assembly of the backing plate, independent of the axle shafts.

The roller-type wheel bearings have no inner race, and contact the bearing journals of the axle shafts.

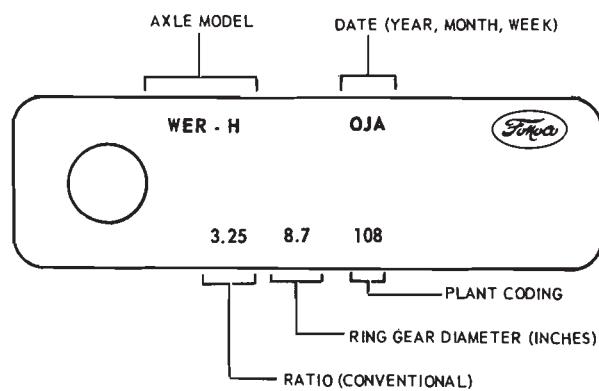
The axle shafts do not use an inner or outer bearing retainer. They are held in the axle by means of C-locks, positioned in a slot on the splined end. These C-locks also fit into a machined recess in the differential side gears within the differential case. There is no retainer bolt access hole in the axle shaft flange.

An identification tag is attached to one of the rear cover-to-housing retainer bolts (Fig. 2). It is important to use the axle model designation if necessary to obtain correct replacement parts.



E 1632-A

FIG. 1—Rear Axle Assembly—Light Duty (WER) Axle



E 1953-A

FIG. 2—Rear Driving Axle Model Identification Tag

2 IN-VEHICLE ADJUSTMENTS AND REPAIRS

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

REMOVAL

Synthetic wheel bearing seals are used for production and as service replacements. Removal and insertion of rear axle shafts must be performed with caution. The entire length of the shaft (including spline) up to the seal journal must pass through the seal without contact. Any roughing or cutting of the seal element during axle removal or installation will result in early seal failure.

1. Raise the vehicle on a hoist.
2. Remove the wheel(s) and tire(s) from the brake drum(s).

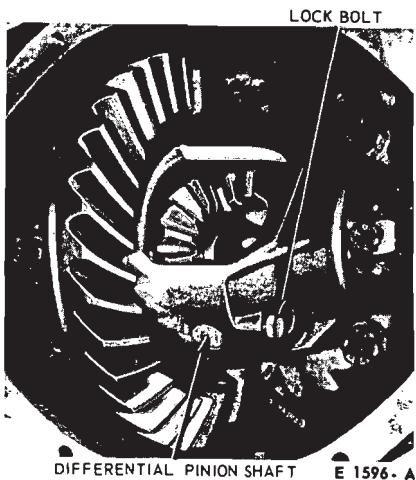


FIG. 3—Differential Pinion Shaft and Lock Bolt

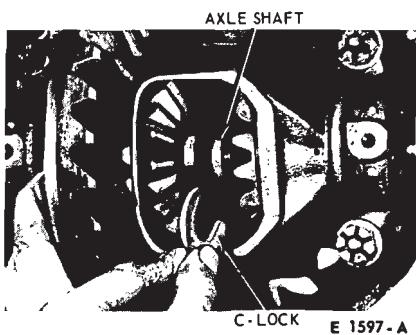


FIG. 4—Removal and Installation of C-locks and Axle Shaft

3. Position a drain pan and loosen the cover to differential housing retaining bolts. Drain the housing.

4. Remove the attaching (Tinnerman) nuts that secure the brake drum(s) to the axle shaft flange(s), and then remove the drum(s).

5. Remove the differential housing cover bolts, cover and gasket. Discard the gasket. Remove the drain pan.

6. Position safety stands under the rear frame member. Lower the hoist and allow the axle to lower as far as possible.

7. Working through the differential case opening, remove the pinion shaft lock bolt and the pinion shaft (Fig. 3).

8. Push the axle shaft(s) inward toward the center of the axle housing. Remove the C-lock(s) (Fig. 4) from the inner end of the axle(s). Remove the axle shaft(s) from the housing. Extreme care must be used to avoid contact of the axle shaft seal lip with any portion of the axle shaft except the seal journal.

9. Remove the bearing and oil seal from the housing as shown in Fig. 5.

10. Inspect the machined surface of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or damage. Carefully remove any burrs or rough spots. Replace worn or damaged parts. A brownish yellow color on the bearing journal of the shaft is normal and the shaft need not be replaced.

Slight pitting and wear is also normal.

INSTALLATION

1. Lightly coat the wheel bearing rollers with axle lubricant. Install the bearings in the axle housing with the tool shown in Fig. 6. The bearing should seat firmly against the shoulder.

2. Wipe all lubricant from the oil seal bore before installing the seal.

3. Inspect the original seal for nicks, scuffs or abnormal wear, and replace it if necessary. The new seals are pre-packed with lubricant and do not require an oil soak before installation.

4. Install the oil seal with the tool shown in Fig. 7. Installation without the use of the proper tool will distort the seal and cause leakage.

5. Replace the O-ring in the C-lock groove on the axle shaft.

6. Slide the axle shaft(s) into place in the axle housing. Exercise care that splines or any portion of the axle shaft(s) do not damage the oil seal(s) and that they engage with the splines of the differential side gear(s).

7. Install the axle shaft C-lock(s) on the inner end of the shaft(s) (Fig. 4) and push the shaft(s) outward so that the shaft locks seat in the counterbores of the differential side gear(s).

8. Position the differential pinion gears and thrust washers 180 degrees apart to the differential side gears. Revolve the gear assembly until the

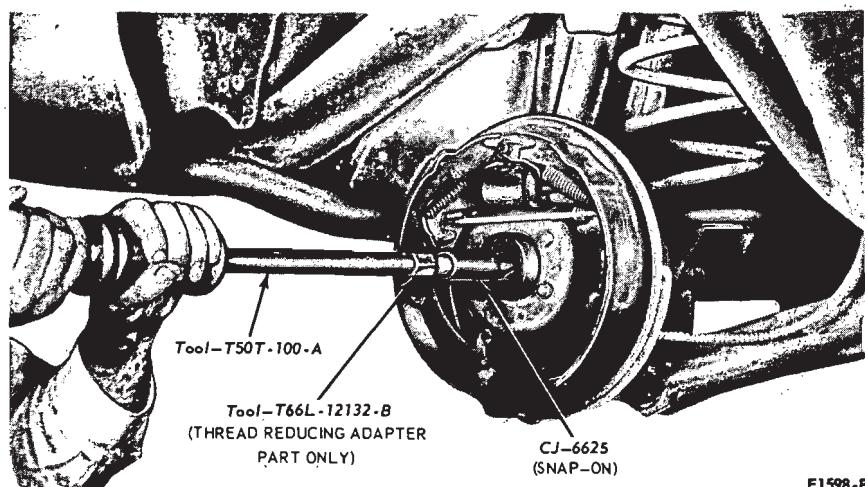


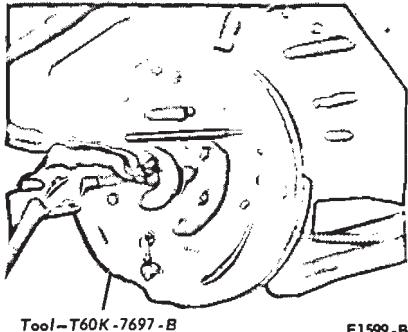
FIG. 5—Removal of Axle Seal or Axle Bearing

holes in the differential case are aligned with the pinion gears.

9. Position the differential pinion shaft through the case and pinions, aligning the hole in the shaft with the

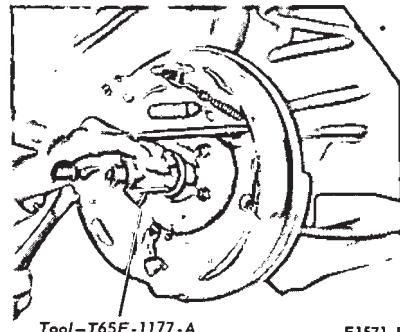
lock bolt hole. Install the lock bolt and torque it to specification.

10. Install the brake drum and tighten the attaching (Tinnerman) nuts.



Tool-T60K-7697-B

E1599-B



Tool-T65F-1177-A

E1571-B

FIG. 6—Installation of Axle Shaft Bearing

FIG. 7—Rear Axle Shaft Bearing Seal Installation

3 REMOVAL AND INSTALLATION

AXLE HOUSING

Refer to Fig. 8.

REMOVAL

1. Raise the vehicle on a hoist.
2. Remove the wheels and tires from the brake drums.
3. Position a drain pan and loosen the rear axle cover to housing attaching bolts. Drain the housing.
4. Remove the attaching (Tinnerman) nuts that secure the brake drums to the axle shaft flanges, and then remove the drums (Fig. 8).

5. Remove the axle housing cover bolts, cover and gasket. Discard the gasket. Remove the drain pan.

6. Disconnect the drive shaft at the drive pinion companion flange. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission housing to prevent leakage. Refer to the transmission group for the appropriate tool.

7. Disconnect the lower end of the shock absorbers at the mounting brackets.

8. Disconnect the track bar from the axle housing stud. If the axle housing is to be replaced, transfer the stud to the new housing.

9. Position safety stands under the rear frame members. Lower the vehicle with the hoist and allow the axle to lower far enough to relieve rear

spring tension.

10. Remove the pinion shaft lock bolt and pinion shaft (Fig. 3), differential pinion gears and thrust washers.

11. Push the axle shaft(s) inward toward the center of the axle housing. Remove the C-locks from the inner ends of the axles (Fig. 4). Remove the axle shafts from the housing. Extreme care must be used to avoid contacting the axle shaft seal lip with any portion of the axle shaft other than the seal journal.

12. Disconnect the vent hose from the rear vent tube and remove all brake lines from the axle housing retaining clips.

13. Remove the brake backing plate attaching nuts and the plates from the axle housing. Suspend the plates above the axle housing with mechanics wire. The hydraulic brake lines and the parking brake cables will remain attached to the brake backing plates.

14. Support the rear axle housing on a jack.

15. Remove the right and left rear springs and insulators.

16. Remove the nuts, washers and pivot bolts that connect the suspension lower arms to the axle housing. Disconnect both arms from the axle housing.

17. Disconnect the upper suspension arm from the axle housing by removing the pivot bolt, nut, lock wash-

er and two eccentric washers.

18. Lower the rear axle to the floor with the jack and remove the axle from under the vehicle.

19. Remove the wheel bearings and oil seals with the tool shown in Fig. 5.

20. If the axle housing is being replaced, transfer all the differential and pinion parts to the new housing. Refer to Section 4, Major Repair Operation for the procedure.

INSTALLATION

1. Lightly coat the wheel bearing rollers with axle lubricant. Install wheel bearings in the axle housing with the tool shown in Fig. 6. The bearings should seat firmly against the shoulder.

2. Wipe all lubricant from the oil seal bore before installing the seal. If axle housing is being replaced, new seals must be installed.

3. Inspect the original seal for nicks, scuffs or abnormal wear, and replace if necessary. New seals are pre-packed with lubricant and do not require an oil soak.

4. Install the seal with the tool shown in Fig. 7. Installation without the use of the proper tool will distort the seal and cause leakage.

5. Raise the rear axle into position under the vehicle with a hoist or floor jack. Connect the suspension lower arms to their mounting brackets on the axle housing with pivot bolts and

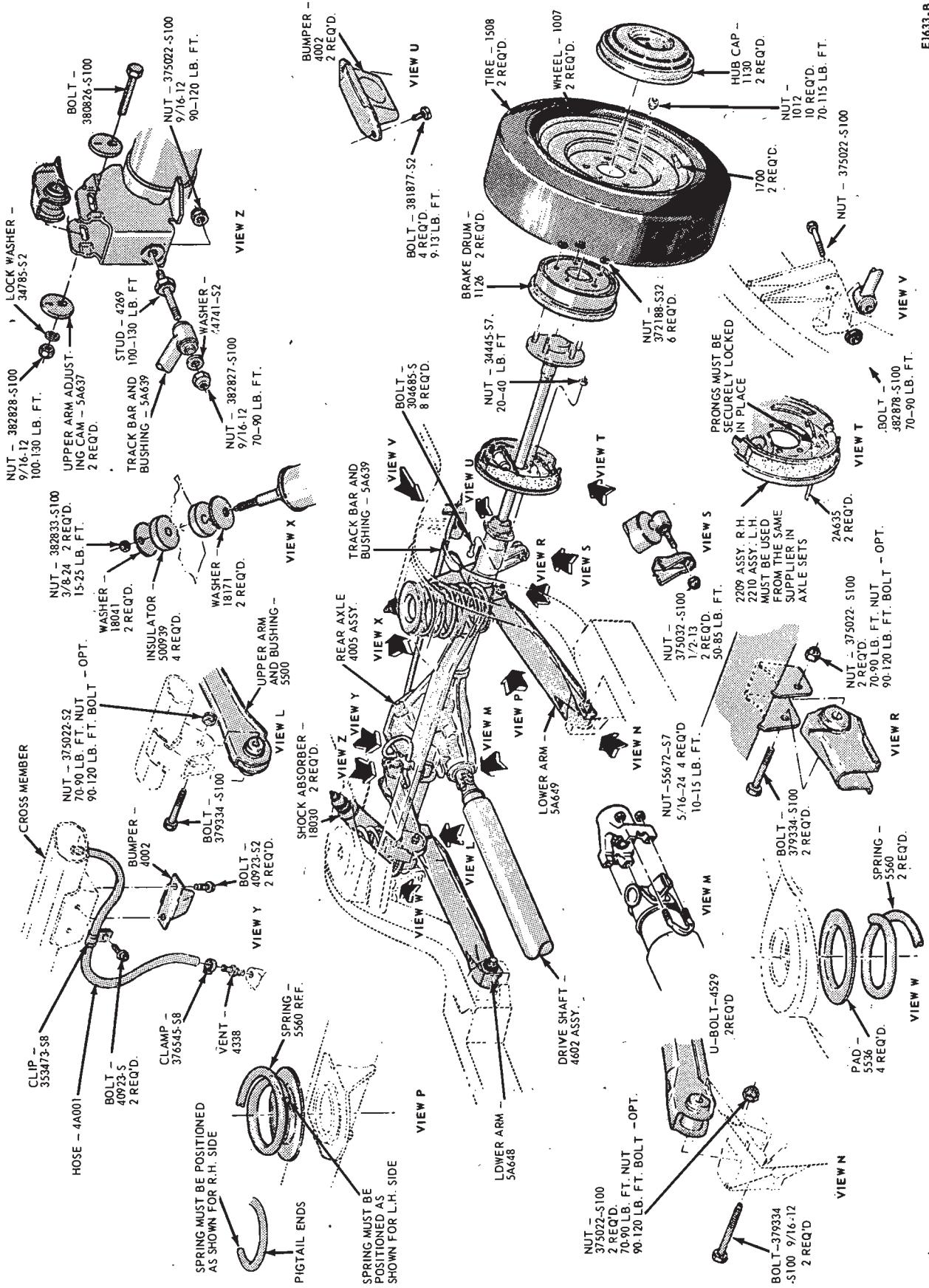


FIG. 8.—Rear Axle Installation—WER Axe

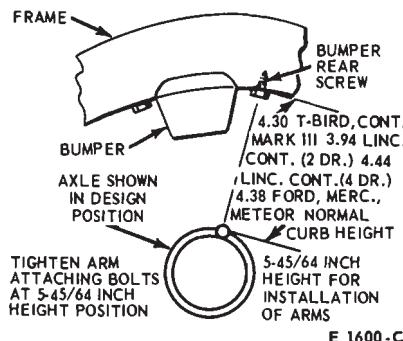


FIG. 9—Axe Normal Curb Height and Controlled Height for Arm Installation

nuts. **Do not tighten the mounting bolts at this point.**

6. Position the suspension upper arm in its mounting bracket on the axle housing and install the adjusting bolt, eccentric washers, lock washer and nut. **Do not tighten the mounting bolt at this point.**

7. Place the rear coil springs and insulators into position in the pockets provided.

8. Place the brake backing plates on the axle housing flanges, install 4 attaching bolts and nuts and torque them to specifications.

9. Position the brake lines to the axle housing and secure them with the retaining clips. If the axle housing is new, install a new vent. When installing the new axle vent apply a small amount of Locktite (C5AZ-19554-B) to prevent oil leakage between vent

and axle housing. Connect the vent tube to the vent.

10. Install the pinion side gears and thrust washer.

11. Slide the axle shafts into place in the axle housing. Exercise care that splines or any portion of the axle shafts do not damage the oil seals and that they engage with the splines of the differential side gears.

12. Install the axle shaft C-lock O-ring and C-lock on the inner end of the shaft and push the shaft outward so that the shaft lock seats in the counterbore of the differential side gear.

13. Position the pinion differential gears and thrust washers 180 degrees apart to the differential side gears. Revolve the gear assembly until the holes in the differential case are aligned with the pinion gears.

14. Position the differential pinion shaft through the case and pinions, aligning the hole in the shaft with the lock bolt hole. Install the lock bolt and tighten it to specification.

15. Clean the gasket mounting surface of the rear axle housing and the cover. Install a new cover gasket, cover and the attaching bolts. Torque the bolts to specification.

16. Raise the rear axle on a hoist and remove the safety stands.

17. Connect the track bar to the mounting stud. Install the washer and nut. Torque the nut to specification.

18. Connect the two rear shock absorbers to the mounting brackets on

the axle housing and torque the attaching nuts to specification.

19. Make sure that both the front and rear pivot bolts of the upper and the two lower arms are loose, then raise the axle assembly to the controlled height (Fig. 9). Hold the axle at the controlled height by placing blocks or pieces of steel pipe between the axle housing and the bumper rear screw on the side rail.

20. With the axle at controlled height, torque the suspension upper and lower arm front pivot bolts and nuts to specifications. Torque the lower arm to axle housing pivot bolts and nuts to specifications.

21. Remove the oil seal replacer from the transmission extension housing. Install the drive shaft in the extension housing. Align the scribe marks on the cups, flange and drive shaft and connect the drive shaft at the drive pinion flange. Torque the attaching bolts to specification.

22. Install the brake drum and attaching (Tinnerman) nuts.

23. Install the wheel and tire on the brake drum. Install the wheel covers.

24. Adjust the drive shaft and pinion angle to specification.

25. Add the amount of specified lubricant required to reach to the bottom of the filler plug hole. Make sure the rear axle is in running position. Install the filler plug and torque it to specification.

26. Lower the vehicle.

4 MAJOR REPAIR OPERATIONS

DISSASSEMBLY OF AXLE

The rear axle components are shown in Fig. 10.

All service operations on the differential case assembly can be performed with the axle housing in the vehicle.

1. Raise the vehicle on a hoist.
2. Position the drain pan under the axle housing. Loosen the housing cover attaching bolts. Drain the lubricant from the housing.

3. Make scribe marks on the drive shaft end yoke and the rear axle shaft companion flange to insure proper position of the drive shaft at assembly. Disconnect the driveshaft from the rear axle companion flange. Be

careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are reassembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

4. Raise the vehicle and place jack-type stands under the rear frame crossmember. Lower the vehicle on a hoist and allow the axle to lower as far as possible.

5. Remove the axle housing cover

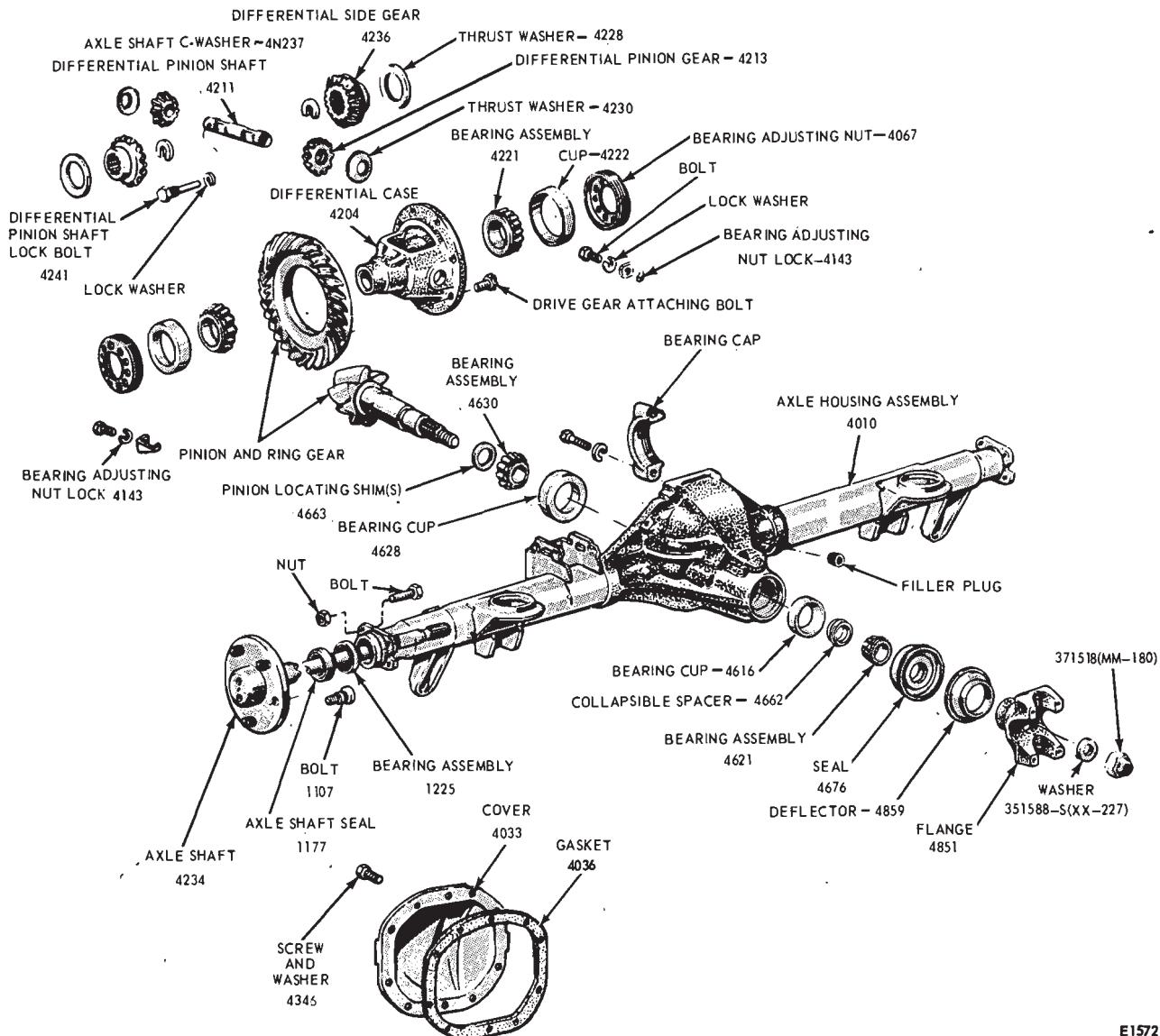
and gasket. Discard the gasket.

6. Perform the Inspection Before Disassembly of Carrier procedure. Refer to Part 15-1, Section 3 of this Shop Manual.

7. Remove the attaching (Tinnerman) nuts that secure the rear brake drums to the axle shaft flanges, and then remove the drums.

8. Working through the differential case opening, remove the pinion shaft lock bolt and pinion shaft (Fig. 3).

9. Push the axle shafts inward toward the center of the axle housing. Remove the C-locks (Fig. 4) from the inner ends of the rear axles. Remove the axle shafts from the housing. Extreme care must be used to avoid contacting the axle shaft seal lip with any



E1572-D

FIG. 10—Disassembled Light-Duty (WER) Rear Axle

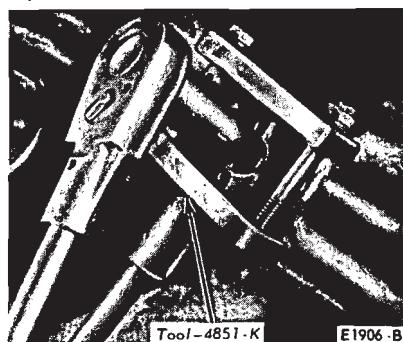
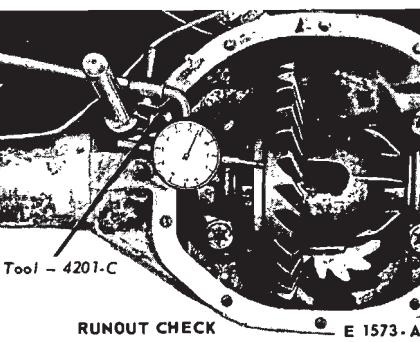
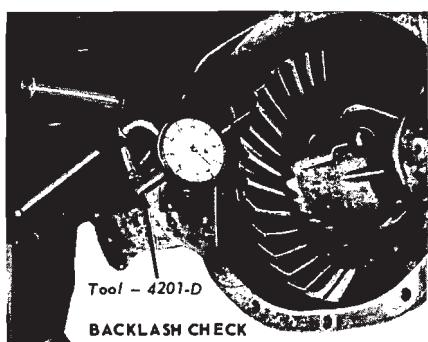


FIG. 11—Checking Backlash and Runout—Light-Duty (WER) Axle

portion of the axle shaft except the seal journal.

10. Remove the bearings and oil seals from the axle housing as shown

in Fig. 5.

11. Remove the pinion side gears and the side gear thrust washers.

12. Remove both side bearing ad-

justing nut locks (bolts).

13. Install a dial indicator (Fig. 11), and check and record the backlash and ring gear runout.

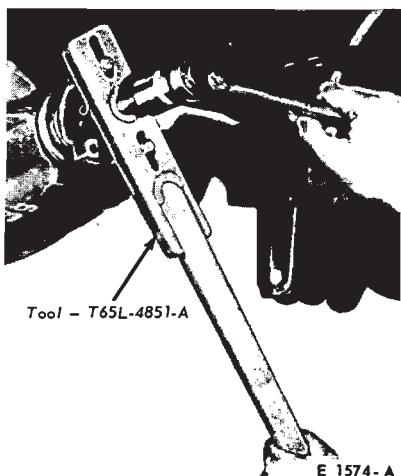


FIG. 13—Drive Pinion Flange Removal

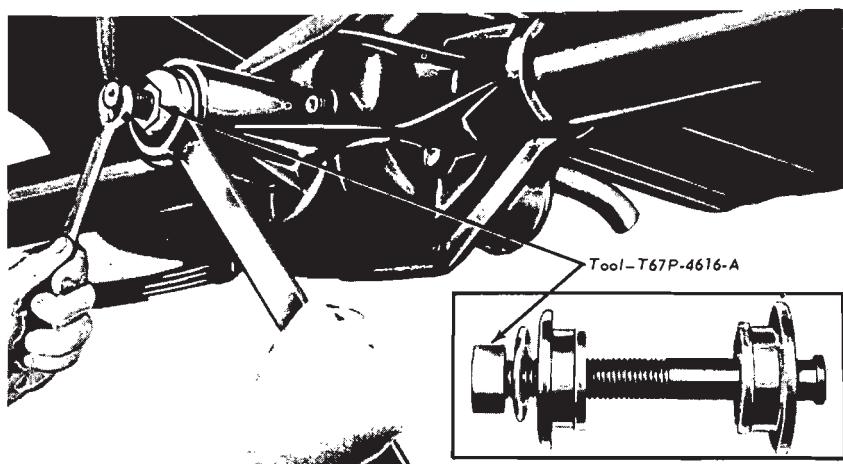


FIG. 16—Pinion Bearing Cup Installation—Typical

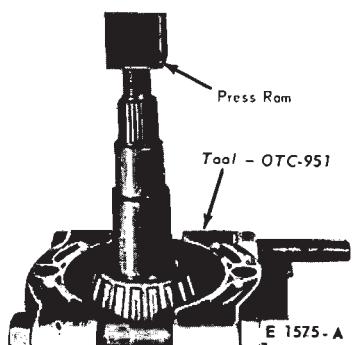


FIG. 14—Pinion Rear Bearing Removal

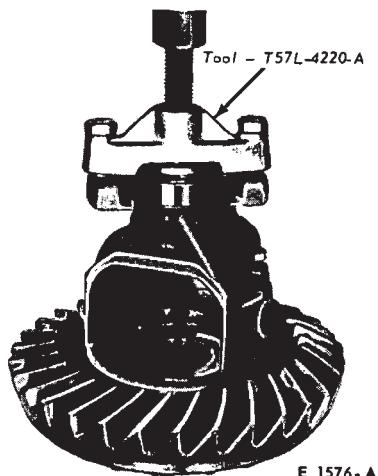


FIG. 15—Differential Bearing Removal

14. Mark one differential bearing cap and the case to help in positioning the parts properly during assembly.

15. Remove the bearing cap retaining bolts. Remove the bearing caps,

cups, adjusting nuts and case assembly.

16. Hold the drive pinion flange and remove the pinion nut (Fig. 12). Discard the nut.

17. Remove the pinion flange (Fig. 13).

18. Drive the pinion out of the front bearing cone and remove it from the carrier housing. Remove and discard the bearing spacer.

19. With a hammer and drift remove the pinion shaft oil seal out through the front of the carrier housing.

20. Remove the pinion rear bearing from the drive pinion shaft (Fig. 14).

21. Measure the shim which is found under the bearing cone with a micrometer. Record the thickness of the shim.

DISSASSEMBLY OF DIFFERENTIAL CASE

1. If the 2 differential side bearings are to be removed from the differential case, use the tool shown in Fig. 15.

2. Remove the bolts that attach the ring gear to the differential case. Press the ring gear from the case or tap it off with a soft-faced hammer.

PARTS REPAIR OR REPLACEMENT

Clean and inspect all the parts as outlined in Cleaning and Inspection, Part 15-1, Section 3 of this Shop Manual. Before assembling the carrier, repair or replace all parts as indicated by the inspection. The principle replacement operations are covered in the following procedures. All other repair or replacement opera-

tions are performed during the Cleaning and Inspection, Part 15-1, Section 3 operations noted above, or during the assembly in this section.

PINION BEARING CUPS

Do not remove the pinion bearing cups from the carrier casting unless the cups are worn or damaged.

If the pinion bearing cups are to be replaced, drive them out of the carrier casting with a drift. Tap on the side opposite the cup. **Use care to prevent the cups from cocking in the carrier.** Install the new cups with the tool shown in Fig. 16. Make sure the cups are properly seated in their bores. If a 0.0015-inch feeler gauge can be inserted between a cup and the bottom of its bore at any point around the cup, the cup is not properly seated.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

DRIVE PINION AND GEAR SET

Individual differences in machining the carrier casting and the gear set require a shim between the pinion rear bearing cone and the pinion gear to locate the pinion for correct tooth contact with the ring gear.

When replacing a ring gear and pinion it should be noted that the **original** factory installed shim is of the correct thickness to adjust for individual variations in **both** the carrier casting dimension and in the original gear set dimension; therefore, to select the correct shim thickness for the new gear set to be installed, follow these steps:

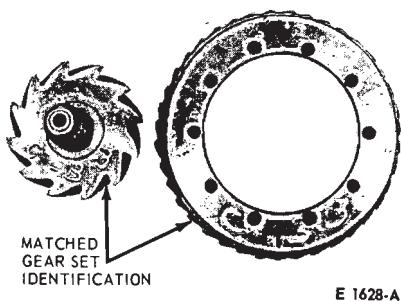


FIG. 17—Pinion and Ring Gear Markings

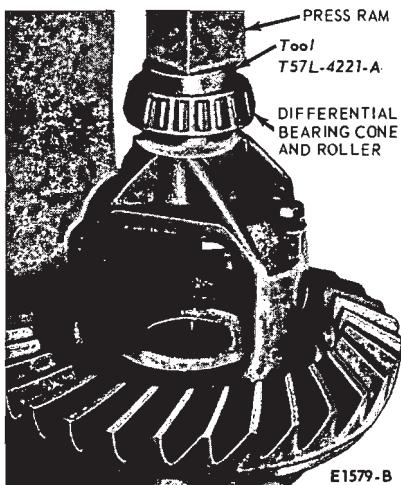


FIG. 18—Differential Bearing Installation

1. Use a micrometer to measure the thickness of the original shim removed from the axle and use the same thickness upon installation of the replacement carrier assembly or drive pinion. If further shim change is necessary, it will be indicated in the tooth pattern check.

2. If the original shim is lost, substitute a nominal shim for the original and use the tooth pattern check to determine if further shim changes are required. Nominal shim thicknesses is indicated in Part 15-7, Specifications.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). Be sure the same identifying (matching) number, painted, appears on the bolt hole face of the ring gear and on the head of the drive pinion (Fig. 17).

3. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly which follows in this section.

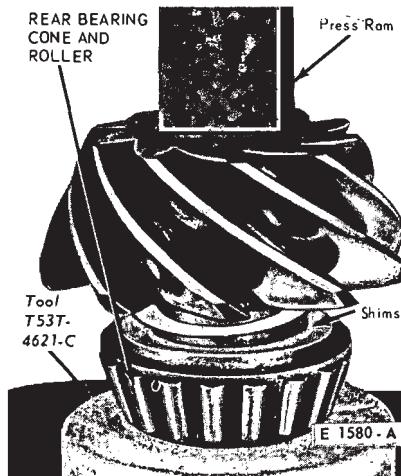


FIG. 19—Drive Pinion Bearing Installation

DIFFERENTIAL CASE, BEARINGS, AND DRIVEN GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout, proceed as follows:

1. Press the original bearings on the one-piece differential case hubs without the ring gear installed.

2. Place the differential bearing cups on the bearing cone and roller and set the differential case in the carrier.

3. Install the matched (marked) bearing caps and adjusting nuts as outlined in steps 11 thru 14 under Installation of Drive Pinion and Differential Case which follows in this section.

4. Tighten the left adjuster nut until it just touches the bearing cup then tighten the nut two notches beyond the point where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 13, Part 15-1, adjust the preload to 0.008 to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings.

6. Check the runout of the differential case flange with a dial indicator. If the runout does not now ex-

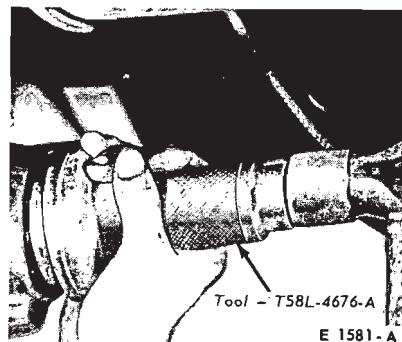


FIG. 20—Installing Pinion Seal

ceed specifications, install a new ring gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective casting or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install new bearings on the case hubs, and again install the differential assembly in the carrier without the ring gear.

9. Check the case runout again with the new bearings. If the runout is now within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is damaged and should be replaced.

ASSEMBLY OF AXLE

Refer to Part 15-1 of this Shop Manual for Cleaning and Inspection procedures before starting assembly operations.

ASSEMBLY OF DIFFERENTIAL CASE

1. Place the ring gear on the differential case. Install the retaining bolts and torque them to specification.

2. If the differential bearings were removed, press them on as shown in Fig. 18.

3. Insert the pinion gear shaft lock bolt into the case (loosely).

INSTALLATION OF DRIVE PINION AND DIFFERENTIAL CASE

1. Place the shim(s) and pinion rear bearing cone on the pinion shaft. Press the bearing and shim(s) firmly against the pinion shaft shoulder (Fig. 19).

2. Place a new pinion bearing preload (collapsible) spacer on the pinion

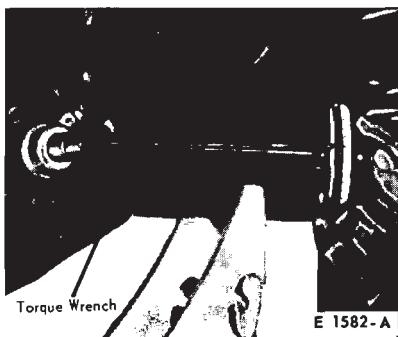


FIG. 21—Checking Pinion Bearing Preload

shaft.

3. Lubricate the pinion rear bearing with axle lubricant.

4. Lubricate the pinion front bearing with axle lubricant. Lubricate the pinion front bearing cone and plate it in the carrier housing.

5. Install a new oil seal in the carrier casting (Fig. 20).

6. Insert the drive pinion shaft (U-joint) flange into the pinion seal and hold it firmly against the pinion front bearing cone. From the rear of the carrier casting, insert the pinion shaft into the flange.

7. Apply a small amount of lubricant to the washer side of the flange nut and start the nut. Use a new nut. Hold the flange with the tool shown in Fig. 13 and tighten the pinion shaft nut. As the pinion shaft nut is tightened, the pinion shaft is pulled into the front bearing cone and into the flange.

As the pinion shaft is pulled into the front bearing cone, pinion shaft end play is reduced. While there is still end play in the pinion shaft, the flange and cone will be felt to bottom. This indicates that the bearing cone and flange have bottomed on the collapsible spacer.

From this point, a much greater torque must be applied to turn the pinion shaft nut, since the spacer must be collapsed. From this point, also, the nut should be tightened very slowly and the pinion bearing preload play checked often, so that the pinion bearing preload does not exceed the specified limits.

If the pinion shaft nut is tightened to the point that pinion bearing pre-

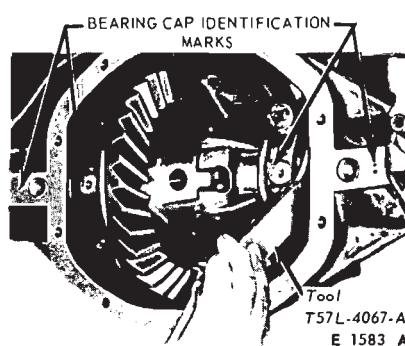


FIG. 22—Bearing Cap Installation

load exceeds the limits, the pinion shaft must be removed and a new collapsible spacer installed. Do not decrease the preload by loosening the pinion shaft nut. This will remove the compression between the pinion front and rear bearing cones and the collapsible spacer and may permit the front bearing cone to turn on the pinion shaft.

8. As soon as there is preload on the bearings, turn the pinion shaft in both directions several times to seat the bearing rollers.

9. Adjust the bearing preload to specification. Measure the preload with the tool shown in Fig. 21.

10. Apply a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

11. Place the cups on the bearings and set the differential case assembly in the carrier casting.

If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 26, Part 15-3.

In almost every case of improper assembly (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type gear set (no timing marks), assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear

teeth.

12. Slide the case assembly along the bores until a slight amount of backlash is felt between the gear teeth. Hold the differential case in place.

13. Set the adjusting nuts in the bores so that they just contact the bearing cups.

14. Carefully position the bearing caps on the carrier casting. Match the marks made when the caps were removed (Fig. 22).

15. Install the bearing cap bolts and lockwashers. As the bolts are tightened, turn the adjusting nut with the tool shown in Fig. 22.

16. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 5 ft-lbs. before making adjustments. Refer to Part 15-1, Section 2 of this shop manual for backlash and bearing preload adjustment procedures.

17. Clean the marking compound from the gear teeth.

18. Install both side bearing adjusting nut locks (bolts) and torque them to specification.

19. Install the differential pinion side gears and thrust washers.

20. Install the rear wheel bearings, seals, rear axle shafts, wheels and tires and the axle carrier cover as outlined under Section 2, Rear Axle Shaft, Wheel Bearing and Oil Seal Replacement.

21. Raise the axle all the way up. Remove the safety support stands.

22. Connect the track bar to the mounting stud. Install the washer and retaining nut, and torque the nut to specification.

23. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft. Align the scribe marks on the cups, flange and drive shaft and connect the rear end of the drive shaft to the axle U-joint flange. Torque the retaining bolts to specification.

24. Lower the vehicle.

5 SPECIFICATIONS

DRIVING AXLE IDENTIFICATION—WER AXLE

Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①	Ident. Tag	Ratio	Ring Gear Dia. (Inches)	Diff. Type ①
WER-F	2.75:1	8.7	C2	WER-H	3.25:1	8.7	C2
WER-G	3.07:1	8.7	C2				

①Type: C2-Conventional Differential—2 Pinion

CE1963-A

ADJUSTMENT TORQUE SPECIFICATIONS—WER AXLE

Description	Torque	Torque
	In. Lbs.	Ft. Lbs.
Minimum torque required to tighten pinion flange nut to obtain correct pinion bearing preload		140①
Pinion Bearing Preload (Collapsible spacer)②Original Bearings New Bearings	8-14 22-32	
①If pinion bearing preload exceeds specification before this torque is obtained, install a new spacer. ②With Oil Seal		

CE1964-A

CLEARANCE, TOLERANCE AND ADJUSTMENT SPECIFICATIONS—WER AXLE

Description	Inches	Description	Inches
Maximum Runout of Backface of Ring Gear	0.003	Nominal Pinion Locating Shim	0.030
Differential Side Gear Thrust Washer Thickness	0.030-0.032	Available pinion Gear Shims in steps of 0.001	0.022-0.038
Differential Pinion Gear Thrust Washer Thickness	0.030-0.032	Backlash between ring gear and pinion teeth	0.008-0.012
Differential Bearing Preload (Case spread across Differential) New Bearings Original Bearings	0.008-0.012 0.006-0.010	Maximum backlash variation between teeth	0.003
		Maximum radial runout of U-joint flange in assembly	0.010 T.I.R.

CE1965-A

ATTACHING TORQUE SPECIFICATIONS-WER AXLE

Description	Torque Ft. Lbs.	Description	Torque Ft. Lbs.
Differential Bearing Cap Bolt	55-70	Rear Cover Screw and Washer Assemblies	25-35
Differential Bearing Adjusting Nut Lock Bolts	12-25	Oil Filler Plug	25-50
		Brake Backing Plate Bolt Nuts	20-40
Ring Gear Attaching Bolts	65-80		
Differential Pinion Shaft Lock Pin	15-22		

CE1966-A

LUBRICANT CAPACITIES AND CHECKING PROCEDURES-WER AXLE

Vehicle	Engine (C.I.D.)	Axle	U.S. Measure-①② Capacity (Pints)	Imperial①② Capacity (Pints)
Ford, Meteor	240, 302	8.7 Inch Ring Gear	4	3 1/5

① All conventional axles use ESW-M2C-105-A lubricant (CGAZ-19580-B).
 ② Approximate refill capacity—Actual lubricant capacities are determined by filling to 1/2 inch below the bottom of the filler plug hole.

CE1967-A

PART 15-05 Drive Shaft—Single U-Joint

COMPONENT INDEX Applies to All Models Except Continental Mark III, Lincoln Continental and Thunderbird	All Models Listed	COMPONENT INDEX Applies to All Models Except Continental Mark III, Lincoln Continental and Thunderbird	All Models Listed
DESCRIPTION	05-01	DRIVE SHAFT REMOVAL AND INSTALLATION	05-02
DRIVE SHAFT ANGLE CHECK	05-01	DRIVE SHAFT RUNOUT CHECK	05-01
DRIVE SHAFT BALANCE CHECK	05-01		
DRIVE SHAFT BALANCING	05-02		
DRIVE SHAFT DISASSEMBLY AND OVERHAUL	05-03		

A page number indicates that the item is for the vehicle listed at the head of the column.

1 DESCRIPTION

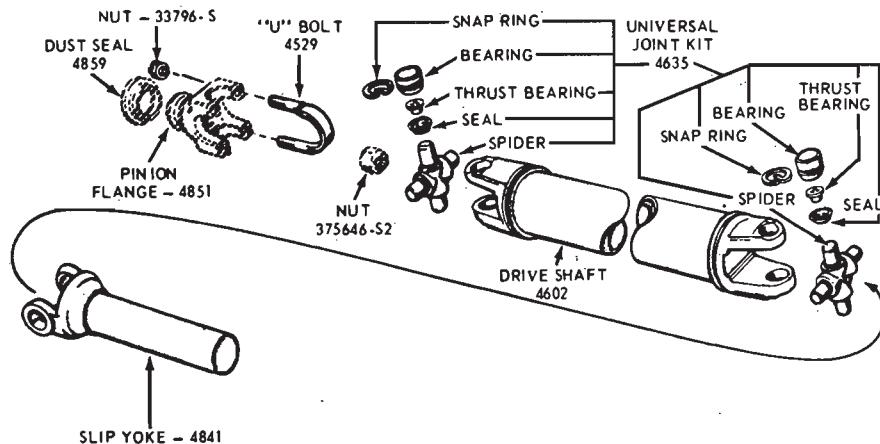


FIG. 1—Drive Shaft and Universal Joints Disassembled

2 DRIVE SHAFT TESTS

DRIVE LINE BALANCE CHECK

If detailed parts of the drive shaft are replaced and shaft vibration is encountered after installation, disconnect the shaft at the slip yoke. Rotate the slip yoke 180 degrees; then, reconnect the shaft to the slip yoke. If the vibration persists, disconnect the shaft at the rear axle companion flange. Rotate the companion flange 180 degrees and reconnect the shaft to the flange.

DRIVE LINE ANGLE CHECK

Vibration or shudder which is noticeable either on fast acceleration or when coasting, using the engine for a brake, may be caused by the rear axle housing being loose on the rear springs or by improper pinion angle. Refer to Group 14, Part 3 for pinion angle checking procedures. If the rear axle U-bolts (Fairlane, Montego, Mustang, Cougar, Falcon and Maver-

The drive shaft is the means of transferring power from the engine, through the transmission, to the differential in the rear axle, and then to the rear wheels. The drive shaft incorporates two universal joints and a slip yoke (Fig. 1). The splines in the yoke and on the transmission output shaft permit the drive shaft to move forward and rearward as the axle moves up and down.

All drive shafts are balanced. If the vehicle is to be undercoated, cover the drive shaft and universal joints to prevent application of the undercoating material.

ick models only) are loose, torque the nuts to specification.

DRIVE SHAFT RUNOUT CHECK

Using a dial indicator, check the runout at each end and in the middle of the driveshaft. The rear check should be made on the small tube section of the shaft between the balance weights and the yoke welds. Driveshaft runout should not exceed 0.035 inch at any one point.

3 REMOVAL AND INSTALLATION

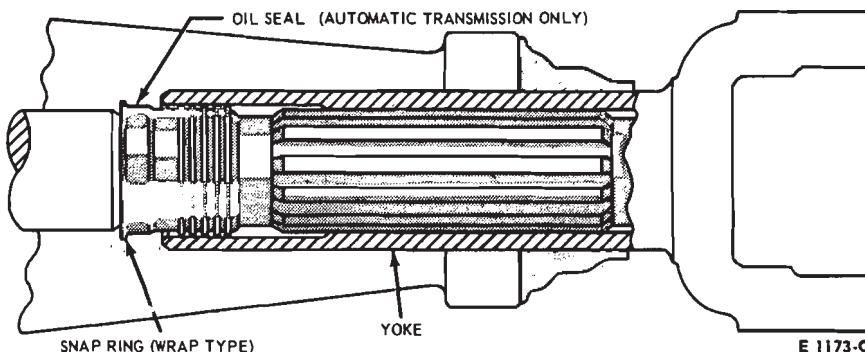


FIG. 2—Output Shaft Spline Seal

REMOVAL

1. To maintain drive line balance, mark the relationship of the rear drive shaft yoke and the drive pinion flange of the axle (if the yellow alignment marks are not visible) with the shaft so that they may be installed in their original positions.

2. Disconnect the rear U-joint from the companion flange. Wrap tape around the loose bearing caps to prevent them from falling off the spider. Pull the drive shaft toward the

rear of the vehicle until the slip yoke clears the transmission extension housing and the seal. Install the appropriate tool in the extension housing to prevent lubricant leakage.

INSTALLATION

1. If either the rubber seal on the output shaft or the seal in the end of the transmission extension housing is damaged in any manner, replace the seal or seals as required. Also, if the

lugs on the axle pinion flange are shaved or distorted so that the bearings slide, replace the flange.

2. Lubricate the yoke spline with B8A-19589-A lubricant. This spline is sealed so that the transmission fluid does not wash away the spline lubricant (Fig. 2). Remove the tool from the extension housing. Install the yoke on the transmission output shaft. Do not allow the yoke assembly to bottom on the output shaft with excessive force.

Install the drive shaft so that the index marks or the yellow mark (if visible) on the yoke (light side) is in line with the yellow mark on the companion flange. This prevents vibration which occurs when the balance of the shaft and balance of the axle pinion flange become additive instead of neutralizing. If a vibration exists, the drive shaft should be disconnected from the axle, rotated 180 degrees and reinstalled.

3. Install the U-bolts and nuts that attach the U-joint to the drive pinion flange. Torque the U-bolt nuts to specification.

4 IN-VEHICLE REPAIR

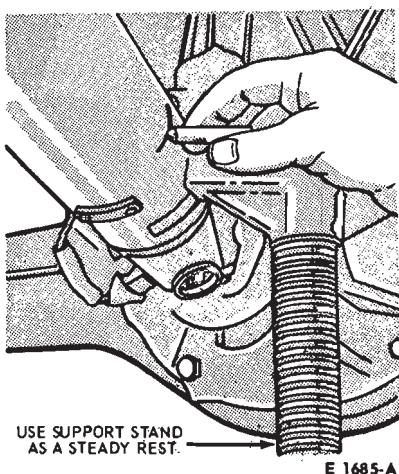


FIG. 3—Marking Driveshaft

DRIVESHAFT BALANCING

If rotating the driveshaft 180 degrees does not eliminate vibration, the

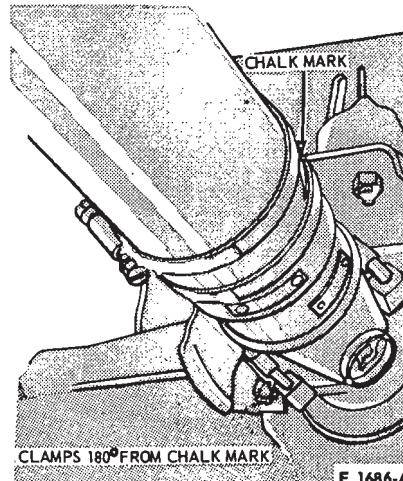


FIG. 4—Installing Whittek Clamps

driveshaft may be balanced using the following procedure:

1. Place the vehicle on a twin post

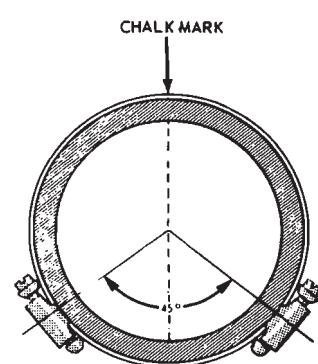


FIG. 5—Rotating Whittek Clamps

hoist so that the rear of the vehicle is supported on the rear axle housing with the wheels free to rotate.

2. With the driveshaft rotating at a

speedometer speed of 40-50 mph, carefully bring a crayon or colored pencil up until it just barely contacts the rearward end of driveshaft (Fig. 3). The mark made by the crayon or pencil will indicate the heavy side of the shaft. Care should be exercised when working near the balance weights to prevent injury to the hands.

3. Install two Whittek type hose clamps on the driveshaft so that so that the heads are located 180 degrees from the crayon marking (Fig. 4). Tighten the clamps.

4. Run the vehicle up to 65-70 mph speedometer speed. If no vibration is felt, lower the vehicle and road test. If unbalance still exists rotate the

clamp heads approximately 45 degrees away from each other and test for vibration (Fig. 5).

5. Continue to rotate the clamp heads apart in smaller amounts until vibration is eliminated. To prevent overheating, do not run the vehicle on the hoist for an extended period.

6. Road test the vehicle.

5 MAJOR REPAIR OPERATIONS

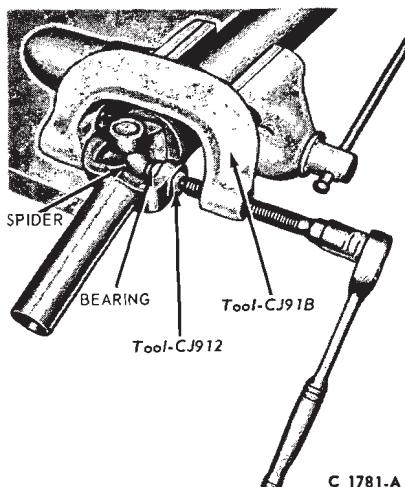


FIG. 6—Removing Universal Joint Bearing.

DISASSEMBLY

1. Place the drive shaft in a vise being careful not to damage it.
2. Remove the snap rings that retain the bearings in the slip yoke and in the drive shaft.
3. Position the tool shown in Fig. 6 on the shaft and press the bearing out of the slip yoke. If the bearing cannot be pressed all the way out of the yoke, remove it with vise grip or channel lock pliers.
4. Reposition the tool to press on the spider to remove the bearing from the opposite side of the yoke.
5. Remove the yoke from the spider.
6. Remove the bearings and spider from the drive shaft in the same manner.

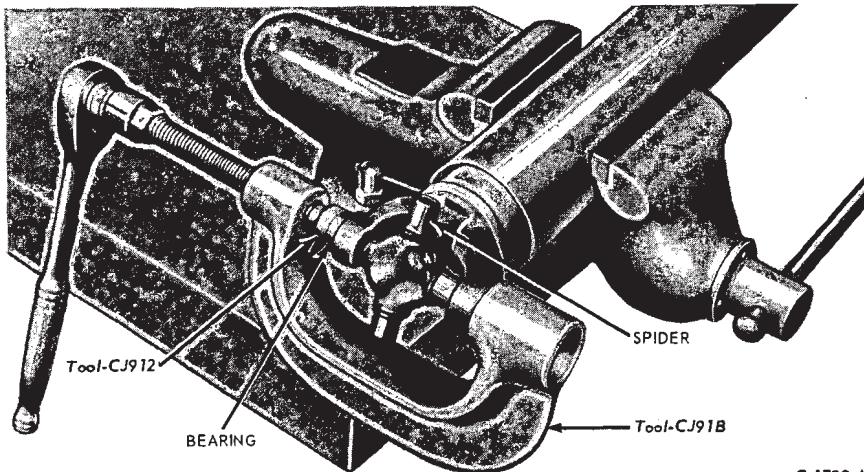


FIG. 7—Installing Universal Joint Bearing

7. Clean all foreign matter from the yoke area at each end of the driveshaft.

ASSEMBLY

1. Start a new bearing into the yoke at the rear of the drive shaft.
2. Position the spider in the rear yoke and press the bearing $\frac{1}{4}$ inch below the surface (Fig. 7).
3. Remove the tool and install a new snap ring.
4. Start a new bearing into the opposite side of the yoke.
5. Install the tool and press on the bearing until the opposite bearing contacts the snap ring.
6. Remove the tool and install a new snap ring. It may be necessary to grind the surface of the snap ring to

permit easier entry.

7. Reposition the drive shaft and install the new spider and two new bearings in the same manner as the rear yoke.

8. Position the slip yoke on the spider and install two new bearings, nylon thrust bearings and snap rings.

9. Check the joint for freedom of movement. If a bind has resulted from misalignment during the foregoing procedures, a sharp rap on the yokes with a brass hammer will seat the bearing needles and usually provide freedom of movement. Care must be taken to support the shaft end during this operation, as well as preventing blows to the bearings themselves. Do not install the drive shaft unless the universal joints are free of bind.

PART 15-06 Drive Shaft—Double Cardan U-Joint

COMPONENT INDEX Applies to Continental Mark III, Lincoln Continental and Thunderbird	All Models Listed	COMPONENT INDEX Applies to Continental Mark III, Lincoln Continental and Thunderbird	All Models Listed
DESCRIPTION	06-01	DRIVE SHAFT REMOVAL AND INSTALLATION	06-02
DRIVE SHAFT ANGLE CHECK	06-02	DRIVE SHAFT RUNOUT CHECK	06-02
DRIVE SHAFT BALANCE CHECK	06-02		
DRIVE SHAFT DISASSEMBLY AND OVERHAUL	06-03		

A page number indicates that the item is for the vehicle(s) listed at the head of the column.

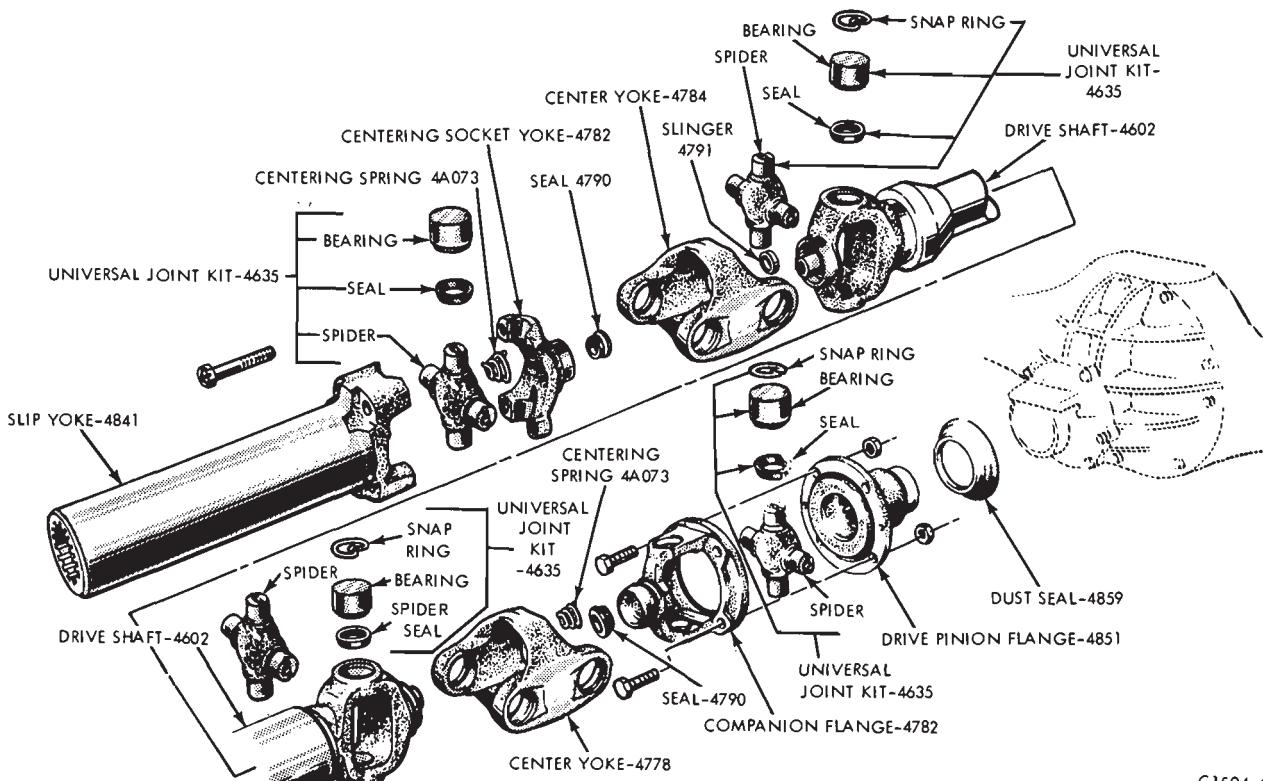
1 DESCRIPTION

The drive shaft is the means of transferring power from the engine, through the transmission, to the differential in the rear axle, and then to the rear wheels. The drive shaft incorporates two double cardan universal joints, one at each end of the shaft

(Fig. 1 and 2). Each double cardan has a center yoke (or cage), a centering socket yoke, and a stud yoke which is welded to each end of the tube assembly. The splines in the yoke and on the transmission output shaft permit the drive shaft to move

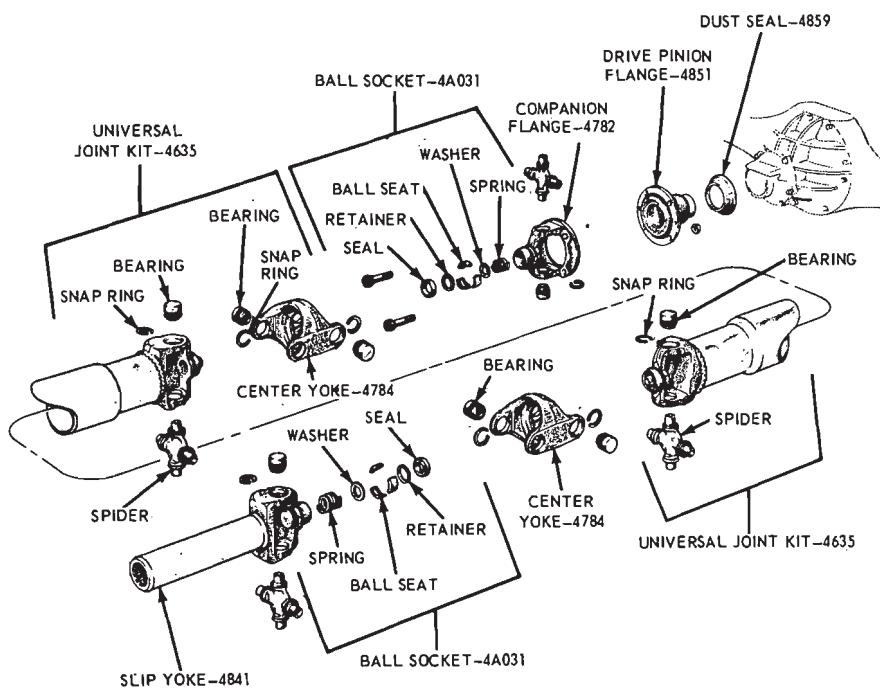
forward and rearward as the axle moves up and down.

All drive shafts are balanced. If the vehicle is to be undercoated, cover the drive shaft and universal joints to prevent application of the undercoating material.



C1594-C

FIG. 1—Drive Shaft and Universal Joints Disassembled—Lincoln Continental



C1770-A

FIG. 2—Drive Shaft and Universal Joints Disassembled—Thunderbird, Continental Mark III

2 DRIVE SHAFT TESTS

DRIVE LINE BALANCE CHECK

If detailed parts of the drive shaft are replaced and shaft vibration is encountered after installation, disconnect the shaft at the slip yoke. Rotate the slip yoke 180 degrees; then, reconnect the shaft to the slip yoke. If the vibration persists, disconnect the shaft at the rear axle companion flange. Rotate the companion flange 180 degrees and reconnect the shaft

to the flange.

DRIVE LINE ANGLE CHECK

Vibration or "shudder" which is noticeable either on fast acceleration or when coasting, using the engine for a brake, may be caused by the rear axle housing being loose on the rear springs or by improper pinion angle. Refer to Group 14, Part 3 for pinion angle checking procedures.

DRIVE SHAFT RUNOUT CHECK

Using a dial indicator, check the runout at each end and in the middle of the driveshaft. The rear check should be made on the small tube section of the shaft between the balance weights and the yoke welds. Driveshaft runout should not exceed 0.015 inch at any one point.

3 REMOVAL AND INSTALLATION

REMOVAL

1. To maintain drive line balance, mark the relationship of the rear drive shaft yoke and the drive pinion

flange of the axle (if the yellow alignment marks are not visible) with the shaft so that they may be installed in their original positions.

2. Disconnect the rear double card-

an joint from the companion flange. Wrap tape around the loose bearing caps to prevent them from falling off the spider. Pull the drive shaft toward the rear of the vehicle until the slip

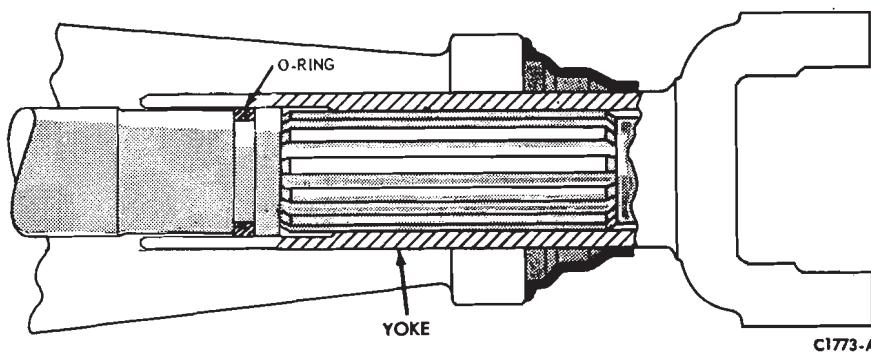


FIG. 3—Output Shaft Spline Seal

yoke clears the transmission extension housing and the seal. Install the appropriate tool in the extension housing to prevent lubricant leakage.

INSTALLATION

1. If either the rubber seal on the output shaft or the seal in the end of the transmission extension housing is damaged in any manner, replace the

seal or seals as required. Also, if the lugs on the axle pinion flange are shaved or distorted so that the bearings slide, replace the flange.

2. On Lincoln Continental models, install the bearing assemblies over the spline teeth in the slip yoke. Lubricate the yoke spline with B8A-19589-A lubricant. This spline is sealed so that the transmission fluid does not wash away the spline lubri-

cant (Fig. 3). Remove the tool from the extension housing. Install the yoke on the transmission output shaft. Do not allow the yoke assembly to bottom on the output shaft with excessive force.

Install the drive shaft so that the index marks or the yellow mark (if visible) on the yoke (light side) is in line with the yellow mark on the companion flange. This prevents vibration which occurs when the balance of the shaft and balance of the axle pinion flange become additive instead of neutralizing. If a vibration exists, the drive shaft should be disconnected from the axle, rotated 180 degrees and reinstalled.

3. Install the U-bolts and nuts that attach the U-joint to the drive pinion flange. Torque the U-bolt nuts to specification. On vehicles equipped with a double cardan joint, install the rear joint-to-drive pinion flange attaching bolts. Torque the bolts to specification.

4 MAJOR REPAIR OPERATIONS

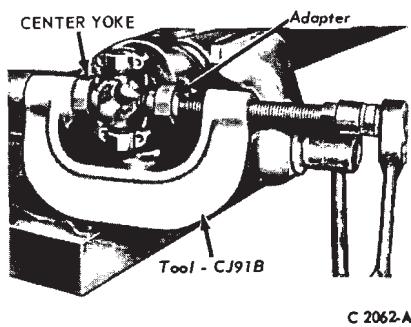


FIG. 4—Partially Pressing Bearing from Center Yoke

DISASSEMBLY (DOUBLE CARDAN JOINT—LINCOLN CONTINENTAL—DANA DESIGN)

1. Mark the position of the spiders, the center yoke, and the centering socket yoke as related to the stud yoke which is welded to the front of the drive shaft tube. The spiders must be assembled with the bosses in their original position to provide proper clearance.

2. Remove the snap rings that secure the bearings in the front of the center yoke.

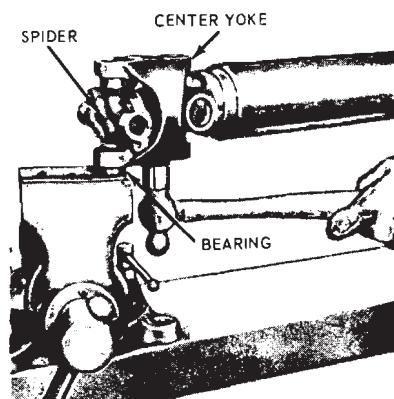


FIG. 5—Removing Bearing from Center Yoke

3. Position the tool as shown in Fig. 4. Thread the tool clockwise until the bearing protrudes approximately $\frac{3}{8}$ inch out of the yoke.

4. Remove the drive shaft from the vise.

5. Tighten the bearing in the vise and drive on the center yoke as shown in Fig. 5 to free it from the bearing.

6. Lift the two bearings (Fig. 6)

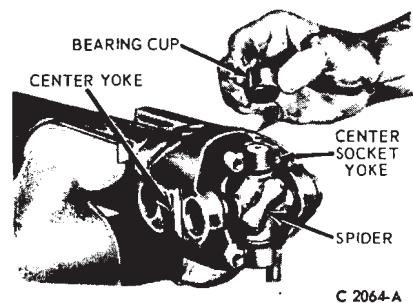


FIG. 6—Removing Bearing Cup from Centering Yoke Socket

from the spider at this time.

7. Reposition the tool on the yoke and move the remaining bearing in the opposite direction so that it protrudes approximately $\frac{3}{8}$ inch out of the yoke.

8. Grip the bearing in a vise. Drive on the center yoke to free it from the bearing (Fig. 5).

9. Remove the spider from the center yoke.

10. Pull the centering socket yoke off the center stud (Fig. 7). Remove the rubber seal from the centering ball stud.

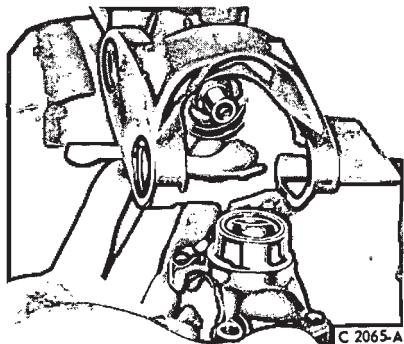


FIG. 7—Removing Center Socket Yoke

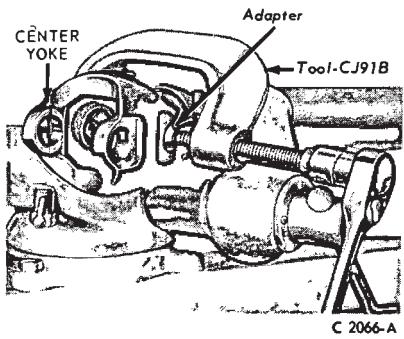


FIG. 8—Removing Bearing from Rear of Center Yoke

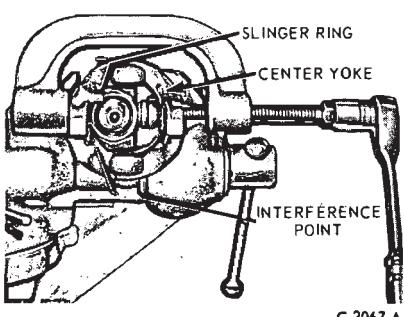


FIG. 9—Center Yoke Interference Point

11. Remove the snap rings from the center yoke and from the drive shaft yoke.

12. Position the tool on the drive shaft yoke (Fig. 8) and press the bearing outward until the inside of the center yoke almost contacts the slinger ring at the front of the driveshaft yoke. Pressing beyond this point can distort the slinger ring. The arrow in Fig. 9 illustrates the interference point.

13. Clamp the exposed end of the bearing in a vise and drive on the center yoke with a soft-faced hammer to free it from the bearing.

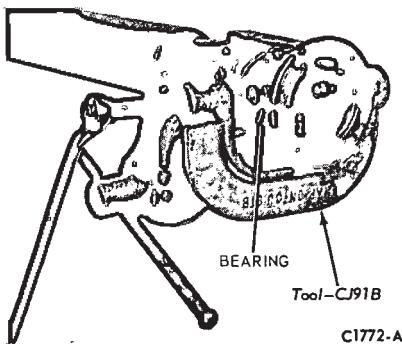


FIG. 10—Partially Pressing Bearing from Center Yoke

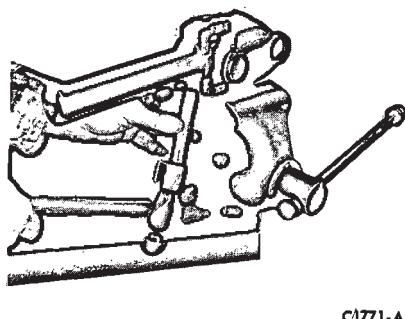


FIG. 11—Removing Bearing from Center Yoke

14. Reposition the tool and press on the spider to remove the opposite bearing.

15. Remove the center yoke from the spider.

16. Remove the spider from the drive shaft yoke in the same manner.

17. Clean all serviceable parts in cleaning solvent. If using a repair kit, install all of the parts supplied in the kit. If the drive shaft is damaged, replace the complete shaft to be assured of a balanced assembly.

ASSEMBLY (DOUBLE CARDAN JOINT—LINCOLN CONTINENTAL—DANA DESIGN)

1. To assemble the double cardan joints, position the spider in the drive shaft yoke. Make sure the spider bosses (or lubrication plugs on kits) will be in the same position as originally installed. Press in the bearing cups. Install the snap rings.

2. Position the center yoke over the spider ends and press in the bearing cups. Install the snap rings.

3. Install a new seal on the centering ball stud. Position the centering socket yoke on the stud.

4. Place the front spider in the center yoke. Make sure the spider bosses (or lubrication plugs on kits) are properly positioned. Press in the bearing cups and install the snap rings.

5. Apply pressure on the centering socket yoke and install the remaining bearing cup.

6. On kits, remove the plug from each spider and lubricate the universal joints. Reinstall the plug in each spider.

DISASSEMBLY (DOUBLE CARDAN JOINT — CONTINENTAL MARK III, THUNDERBIRD — SAGINAW DESIGN)

1. Working at the rear axle end of

the shaft, mark the position of the spiders, the center yoke, and the centering socket yoke as related to the companion flange. The spiders must be assembled with the bosses in their original position to provide proper clearance.

2. Position tool CJ91B as shown in Fig. 10. Thread the tool clockwise until the injected nylon moulding snaps and the bearing protrudes approximately $\frac{3}{8}$ inch out of the yoke.

3. Remove the driveshaft from the vise.

4. Tighten the bearing in the vise and tap on the weld yoke to free the bearing from the center yoke (Fig. 11). **Do not tap on the driveshaft tube.**

5. Reposition tool CJ91B on the yoke and force the opposite bearing outward and remove it.

6. Position the tool on one of the remaining bearings and force it outward approximately $\frac{3}{8}$ inch.

7. Grip the bearing in the vise and tap on the weld yoke to free the bearing from the center yoke. **Do not tap on the driveshaft tube.**

8. Reposition the tool on the yoke to press out the remaining bearing.

9. Remove the spider from the center yoke.

10. Remove the bearings from the driveshaft yoke as outlined above and remove the spider from the yoke.

11. Insert a screwdriver into the centering ball socket located in the companion flange and pry out the rubber seal. Remove the retainer, three piece ball seat, washer and spring from the ball socket.

12. Inspect the centering ball socket assembly for worn or damaged parts. If any damage is evident replace the entire assembly.

13. Repeat Steps 1 through 12 to disassemble the transmission end of the driveshaft.

**ASSEMBLY (DOUBLE
CARDAN JOINT — CONTINENTAL
MARK III, THUNDERBIRD —
SAGINAW DESIGN)**

1. Working at the rear axle end of the driveshaft, insert the spring, washer, three piece ball seat and retainer into the ball socket.
2. Using a suitable tool, install the centering ball socket seal.

3. Position the spider in the driveshaft yoke. Make sure the spider bosses are in the same position as originally installed. Press in the bearing cups with tool CJ91B. Install the internal snap rings provided in the repair kit.

4. Position the center yoke over the spider ends and press in the bearing cups. Install the snap rings.

5. Install the spider in the companion flange yoke. Make sure the spider bosses are in the same position as originally installed. Press on the bearing cups and install the snap rings.

6. Position the center yoke over the spider ends and press on the bearing cups. Install the snap rings.

7. Repeat steps 1 through 6 to assemble the transmission end of the driveshaft.